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GOVERNMENT OF TAMILNADU
TRUTH ALONE TRIUMPHS

WORKING PLAN
FOR
THE THANJAVUR FOREST DIVISION

1st April 1971 to 31st March 1981

BY
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INTRODUCTION.

The Thanjavur Forest Division as it exists today comprises of Pattukottai Range, five Plantations Ranges, one Farm Forestry Range and one Wild Life Unit lying in the entire Thanjavur Revenue District and Tiruchirappalli and Kulithalai taluks of Tiruchirappalli Revenue District. This plan revises the unified Working Plan prepared by Thiru K. P. D. Rao.

The revision of Thanjavur Working Plan was taken up from 1st July 1969 with headquarters at Coimbatore. The reconnaissance report was submitted on 20th December 1969 and after a discussion held at Thanjavur on 21st January 1970, orders on the reconnaissance report were issued by the Chief Conservator of Forests on 13th March 1970 in Ref. No. 24773/69-D1. This Working Plan has been prepared in accordance with the report so approved.

Range Officers Thiruvalargal N. Gopalan and R. Balabarathy and Foresters Thiruvalargal R. Chakravarthy, K. Arumugam, V. Lakshminarayanan, P. Aravindakshan, C. G. Dharanipathy, S. Chidambaram assisted the author in the field work and in compilation of statistics. The author wishes to place on record the valuable assistance and unstinted co-operation rendered by the Range Officers and Foresters in the preparation of the Working Plan.

The writer is thankful to Thiru T. Jeyadev, I.F.S., the then Chief Conservator of Forests for his instructions and suggestions. Thiru K. A. Bhoja Shetty, I.F.S. the then Conservator of Forests and present Chief Conservator of Forests directed the preparation of the plan. The writer is greatly indebted to him for the guidance and valuable instructions given at all stages during the preparation of the plan. The writer is thankful to Thiru S. A. Rahmatullah Conservator of Forests, Development and Working Plans Circle for kindly going through the various draft Chapters and offering his valuable suggestions.

The writer is greatful to the District Forest Officer, Thanjavur division for his valuable help and suggestions and his staff for the whole hearted co-operation extended to the Working Plan party during the preparation of this Working Plan.

The Working Plan Division was wound up on 31st October 1970 after the preparation of the Thanjavur Working Plan.

Coimbatore
13th November 1970.

M. S. KARUNIKARAN,
Forest Working Plan Officer.

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CHAPTER I—THE TRACT DEALT WITH

SECTION 1—NAME AND SITUATION.

1. *Name.*—This Working Plan deals with all the forests of Thanjavur forest division as constituted on 1st September 1956 as per G.O. Ms. No. 1584, Food and Agriculture, dated 20th June 1956. This will be known as Thanjavur division Working Plan.

2. *Situation.*—The forest areas covered by this plan including the avenue and compact plantations raised on the banks of rivers and canals, etc., lie scattered over the entire Thanjavur revenue district and parts of Kulithalai and Karur taluks of Tiruchirappalli district.

3. The division is bounded on the north by the Coleroon river which separates it from Tiruchirappalli and South Arcot district; on the east by the Bay of Bengal, on the south by the Palk Strait and Ramanathapuram and on the west by Tiruchirappalli. The entire tract lies on the east coast of Tamil Nadu between 9°50" and 11 35" north latitudes and 77 50" and 79 50" east longtitudes.

SECTION 2—CONFIGURATION OF THE GROUND.

4. The characteristic feature of the forests of this division is that they are restricted to a large number of widely scattered blocks of varying size and importance. The tract may be divided into the following groups to facilitate easy description:—

(*a*) The plain forests,

(*b*) Padugais and porambokes,

(*c*) The coastal forests.

5. (*a*) *The plain forests.*—These comprise of all the ex-zamin forests such as Neppugai, Komapuram, Ettiathalai, Kurumbur, Senthangudy, Melpanaikadu and ex-panchayat forests of Avanam, etc. The terrain is an open plain, sloping towards the east and devoid of any hills. South and south-west of Thanjavur the country rises and forms a small plateau known as Vallam table land, broken by small ridges of grits and sand stones. The plain forests are very much scattered and discontinuously distributed over the dry inland country supporting thorny scrub jungles only. Most of the cashew plantations of this division are situated in this type of forests.

6. (*b*) *Padugais and porambokes.*—All along the course of the Cauvery and its distributaries on both the banks, numerous narrow strips of river poramboke lands called the "padugais" occur cut up by countless patta lands. These strips ranging in width from about 3 metres to 100 metres (approximately) are made up of bits of anything from 0.15 ha. to 10 ha. Erosion of the lands taking place steadily year after year especially during the floods has engulfed large slices of these lands which have become part of the beds especially at Maharajapuram. No measures have been taken to stop this recurring menace except when the flood banks are threatened. In many place poramboke lands have been washed away. Eventhough the padugais and poramboke lands are dry they are very fertile. Flood banks of the Cauvery and its distributaries are away from the water courses in the upper reaches where the river is wide and are closer in the lower reaches where the rivers become narrower gradually. Thoughout the Coleroon there are well maintained flood banks. The poramboke lands along these flood banks are generally sandy owing to floods, when huge quantities of sand are deposited on these lands. Areas having good soil are rare and as such there are no superior type of vegetation.

7. The padugais and porambokes contain the casnarina plantations of Maharajapuram, Sodiakudy, Gopalasamudram, Alakkudi and Udayamarthandapuram, etc.

8. Teak is planted on the padugai and poramboke lands along the banks of the Cauvery and its distributaries, the Coleroon and Vennar river, etc. They are small and scattered far and wide. The belt of land available for planting along the river and canal margins is generally very narrow permitting either one row or two rows

depending upon the width of the available land. In certain localities, however, compact areas of greater or lesser extent of padugai land are available for planting. Unfortunately much of the banks are too narrow or completely eroded away or unsuitable for growing teak. Further some of the padugai lands are under encroachment for a long period.

9. The padugais and porambokes contain the majority of avenue and compact teak plantations of Thanjavur division.

10. (*c*) *The coastal forests.*—The coastal forests lie in the Cauvery delta along the coast in Sirkali, Tiruthuraipoondy and upland portion of Pattukottai and Aranthangy taluks.

11. The coastal region have neither hills nor hillocks, save the ridges of blown sand which fringe the narrow strip of beach along the coast and contains the casuarina plantations, sand dunes the mangroves, etc. The coastal forests comprise of the casuarina plantations of Pudupattinam. It includes Talainayar, Muthupet, Turaikadu reserved forests in addition to the Pudupattinam mangroves and cocoanut plantations at Manamelkudy. The Vedaranyam salt swamp which is the longest swamp in Tamil Nadu runs along the coast from Point Calimere westwards to Muthupet. The major portion is covered by extensive lagoons and streams in Talainayar, Muthupet and Turaikadu reserved forests, the wooded area not more than 5 to 10 per cent of the total area.

12. Kodaikadu is a dry evergreen type of forests situated in an undulating sandy plain almost at sea level and is intersected by many broad but shallow swamp creeks. The creeks are generally dry except when the monsoon winds in June to August force up the sea water into them through the back water. The wooded area of this forest is only about 40 to 50 per cent (approximately) of its gross area, the remaining portion being covered by grassy blanks and shallow saline swamps. The forest, however, effectively protects the villagers of Kodiakarai, Kodiakadu and the Vedaranyam salt factory from severe sand drifts which, but for it, would have overwhelmed them.

13. The Talainayar reserved forest occupies 1,236.29 ha. but its wooded area is only about 6 per cent of the total area, the rest being open space with Umri shrubs scattered about it. It is a mangrove forest land locked, liable to submersion in the ranks and broken up by numerous creeks and a large central lagoon of the Adappar. The rivers Adappar and Nallar run through this forest. Its soil is Alluviyal Saline and Slushy throughout.

14. The Muthupet reserved forest occupies 6,803.01 ha., out of which only about 4 per cent (approximately) are occupied by trees, the rest being covered by streams, lagoons and swampy and grassy blanks. Like Talainayar it is also a mangrove forest with slushy soil which is specially treacherous along the seashore. It is traversed by several large lagoons and streams of which the chief are Paminiar, Koraiyar, the Kilanthagiar and the Velvanar.

15. *Drainage.*—The division is drained by a number or rivers. The rivers almost all of them flow to the east into the Bay of Bengal. The most conspicuous feature of the district is the river Cauvery with its branches. The head of Cauvery delta proper is located at the Upper Anicut, where the Cauvery bifurcates into Coleroon on the north and the southern tributary retaining the name of Cauvery. After 25 Kms. the Coleroon which is a chief source of drainage takes a north easterly direction skirting the district along its entire length on the north and enters the sea and carries the bulk of the flood waters. The Cauvery takes a southern direction splitting up into numerous branches and covers the whole of the delta with a vast network of irrigation channels. Some of the branches of the Cauvery find their way into the sea carrying with them all the surplus water discharged by the drainage.

16. At Grand Anicut about 28 Kms. below the Upper Anicut the Coleroon and the Cauvery very nearly meet forming what is known as Srirangam island. The surplus drainage channel from the Grand Anicut to the Coleroon completes the formation of this land This anicut built about1,500 years back across the Cauvery by the early Cholas saves the delta from floods by its ability to discharge the surplus waters of the Cauvery into the Coleroon. At Grand Anicut Cauvery branches into two main rivers, the Cauvery on the north and the Vennar on the south at the heads of each of each of which a regulator has been built. The new canal excavated under the Cauvery–Mettur project called the Grand Anicut canal also takes off from the same site. Lower down the Cauvery again gives off a branch on the south called the Kodamuruthy river at Tirukattupalli where there are also two regulators. The Vennar bifurcates into two branches called the Vennar on the south and the Vettar on the north at a place about 16 Kms. west of Thanjavur where Vennar-Vettar regulator is situated. These main branches of Cauvery divide and subdivide into innumerable distributaries forming a network of canals and channels providing the means of irrigation for the entire delta. Some of the branches of the Cauvery find their way into the sea carrying with them all the surplus water discharged by the drainage of the wet cultivation while others get lost in the vast expanse of paddy fields. The Cauvery itself now reduced to an insignificant channel joins the sea at Kaveripattinam about 12 Kms. north of Tranquebar.

17 The Kodamuruthy after flowing through Thanjavur and Papanasam taluks enters the Nannilam taluk with the changed name of Solaisudamaniar beyond the Puthar-Solaisudamaniar regulator and eventually joins the Vettar. Between Kodamuruthy and Cauvery the latter has woven an intricate web of canals which includes 12 main distributaries besides innumerable channels which take water directly to the wet lands from the Grand Anicut to the sea, the total length of the important distributaries of this system is about 54 Kms. The distributaries are Veerasolanar, Manjalar, Mahimalayar, Arasalar, Nallar, Nattar, Vanjiar, Keerthimanar, Kodamuruthy, Puthar, Velappar, Mudikondar and Tirumalairayan. There are Adappar, Uppanar and Koraiyar, Paminiar, etc. which serve as drainage of surplus water at the tail end.

18. The Coleroon after forming the island at Srirangam wends its way in a north-easterly direction and throughout its length of flow forms the natural boundary between the districts of Thanjavur on the south and Tiruchirappalli and South Arcot on the north. 110 Kms. below the Upper Anicut the river is spanned by a regulator known as the Lower Anicut built across her two branches. Here, Ponneri, North Rajan and Vadavar channels take off from the northern flank and irrigate lands in the Udayarpalayam taluk of Tiruchirappalli district and Chidambaram taluk of the South Arcot districts. From the southern flank South Rajan channel takes off and this is utilised for irrigation in Mayuram and Sirkali taluks of Thanjavur. No more use is made of the river further down save as drainage and it enters the Bay of Bengal at Devikottai with very little water except during floods.

SECTION-3 GEOLOGY, RZCK AUD SZIL.

19. The geological formation of Cauvery delta is very simple since fluviatile alluvium, presenting variations in its composition in different parts, constitutes its entire structure. In the more western portion of the delta the alluvium partakes more of rich loam sometimes in the form of fine reddish silt and sometimes of blackish clay but often of pale clayey mud which gradually diminishes towards the coast until it is lost in the blown sands of the coast. The upland portion of the district excepting the country round Pattukottai is occupied by lateritic rocks. These rocks meet the fluviatile alluvium at the western extremity of the district, not far from the south bank of Cauvery but the belt of alluvium widens as it runs eastwards, while the lateritic areas gradually narrow until some thirty kilometres south east of Thanjavur, they disappear beneath the alluvium. Another branch of them travels in a straight line from Thanjavur as far as Pattukottai country and eastwards until it meets the marine deposits near Pattukottai as it approaches the sea. Near Gandarvacottai on the Pudukottai border are found Cuddalore sand stones which are hard, heavy and overlaid by gritty varieties of the same rock having different colours like mottled pale purple, yellow and rusty red.

20. Only small quantity of iron ore is found in the lateritic rocks near Vallam. Vallam is well known for its Vallam stones the chief varieties of which are the pellucid rock crystal, the dark brown or smoky quartz, the yellow cairngorm and amethyst. These are cut by the lapidaries of Thanjavur into a variety of ornaments and trinkets, beads and spectacle lenses. There too are found pebbles of quartz and quartizite embedded in Cuddalore sand stones which are generally somewhat brittle but the better quality of which can be used with advantage in hull mills to grind materials that would not be affected by contamination with silica. Laterite of good quality occurs at Vallam and Gandervacottai. When first extracted, it is a flaky ferruginous sandy clay, rather friable but when exposed for some months to the action of the sun and rain becomes hard and gets encrusted with a dark polish of hydrated oxide of iron which protects it from further change and resists decay, however long the stone may be exposed. Sandstones occur near Vallam and Thanjavur which are fit for building. Kanker occurs in varying thickness near Alakkudi and west and south west of Thanjavur town which is high in lime and low in magnesium and is used for lime burning. Natural gas occurs near Sirkali which can be used for heating or for driving gas engines. Titanium mineral (ilmenite) occurs near Tranquebar, Adiramapattinam and Nagapattinam in small stretches which can be used for making good quality steel and for manufacturing a high grade opaque, non-corrosive paint called Titanium white. Zircon, a high grade refractory mineral which can be used for making super refractory bricks, crucibles, retorts and plastic products occurs as a constituent of the heavy sands along the sea cost of Tranquebar. Yellow ochre is found spread over small areas west of Vallam and deposits of sand occur n the Tiruchirappalli border south of the Cauvery.

21. A note on the Geology of Thanjavur district by Thiru Vemban of Geological Survey of India is furnished below :—

Introduction.—The Thanjavur district covers an area of 9,684 square kilometre, it consists of twelve taluks namely Sirkali, Mayuram, Kumbakonam, Nannilam, Pappanasam, Thanjavur, Nagappattinam, Orathanad, Mannargudy, Tiruthuraipoondy, Pattukottai and Aranthangy.

22. The northern and eastern portions of the district form the delta of the Cauvery, comprising of the whole of Kumbakonam, Mayuram, Sirkali and Nannilam taluks and parts of Thanjavur, Papanasam, Mannargudy, Tiruthuraipoondy and Nagapattinam taluks. The southern portion of the district lies about 15 metres higher with light soils and comprises of the whole of Pattukottai and Aranthangy taluks and southern portions of Thanjavur and Papanasam and the western part of Mannargudy. The deltaic portion is monotonously flat sloping very gently towards the east and is devoid of natural eminences, save the ridges and hillocks of blown sand which fringe the sea-coast. Salt land is generally met within hollows on the coast and the southern seaboard of Tiruthuraipoondy taluk is a salt swamp.

23. The new delta and upland portion of the district are an open flat sloping to the east and equally destitute of hills. A small part of the upland portion lying to the south and south-west of Thanjavur rises a little above the surrounding level and forms a small plateau known as Vallam table land and is broken by small ridges of grit and sand stones. This portion is occupied by sedimentary rocks chiefly laterite and thickly covered with quartz, pebbles and sand stones. The other part of the district consisting of the southern portion of Thanjavur and western portion of Pattukottai and Aranthangy taluks does not form the natural delta of the Cauvery. This tract is about 15 metres higher than the delta except along the vallam ridge where the height is little more but like the delta it is an open sloping from northwest to southeast and is similarly destitude of high eminances.

24. *Geology*.--Except for a very small part, the district is largely covered by river alluvium. At the north-western part of the district there are some geological formations which are given below in the increasing order of antiquity :—

Recent and sub-recent	Alluvium
	Kankar
	Laterite
Tertiary (Miocena-Pliocena)	Reddish brown, Yellow and greyish gritty sandstone.
Cretaceous (Ariyalur)	Buff and brownish yellow calcareous sandstone.
Archaean	Quartzo-felspathic micagneiss traversed by quartz veins and pegmatites Quartz-magnetite rock.

25. Mineral Occurrences.—1. Kankar occurs at Tirumalaisamudram (10°44′ : 79°01 ') and to the south-east of Budalur (10°47 ' : 78°50 '). Five patches have been located at Tirumalaisamudram having a thickness of 2.4 to 3.0 metre. Their total reserves are of the order of 5,32,530 tonnes. The kankar is of cement grade but the reserves are small.

2. To the south-east of Budalur, kankar nodules are associated with reddish brown soil as isolated patches over weathered quartzo-felspathic gneiss in the neighbourhood of Chellappampettai (10°46 ' :79°00) and Pudur (10°47 ' :79 ° 00').

3. Limeshell occurs near the third milestone on the road leading to Tiruppundi (10°38' :79°49') from Nagapattinam. The shells occur in a stiff calcareous clay at a depth of 2.4 to 4.6 metre. The shelly layer is about 10 centimetre in the thickness and is associated with kankar. These are worked on a small scale for lime burning.

4. Pebbles of quartz occur at and around Vallam (10°40' : 79°03').

5. The beach sands of Kodiyampalayam (11°23' : 79°44') and those lying north and south of Tranquebar (11°01' : 79°51) upto Karaikal carry a high concentration of ilmenite and also bear garnet. The Tranquebar deposits have a probable reserve of 90,400 tonnes of ilmenite and 4,900 tonnes of garnet.

6. The alluvial soil of the delta and the rivers are the source of inexhaustable materials for construction purposes like brick-making, concrete and mortar work.

7. Red earth is reported near Kanniyakudi (11°11 ' : 79°41 ').

8. Natural gas was found to emanate from boreholes and dug-well located in the alluvial strate at Neyapattur (11°13 ' : 79°49 ') and Mangamadam (11°14 ' : 79°49 '). A sample has analysed 75% methane with small quantities of Co_2 and nitrogen. The gas was probably derived from decaying beds of vegetation at a depth of 60.9 metre.

9. Peat was reported to occur at a spot near the promontary about 32 kilometres from Point Calimere.

26. *Soil*.—The soil of the delta is entirely alluvial but varies greatly in quality. Marked differences are often found between belts of land and even sometimes in the same belt itself. The soils commonly met within the forests of the division can be broadly classified into the following groups :—

(1) Alluvial soil

(2) Red ferruginuous soil or lateritic soil

(3) Regur (Black soil)

(4) Arenaceous soil

(5) Kallar soil

27. *Alluvial soil.*—These alluvial soils occur mostly in the deltaic region along the bank of rivers and canals varying greatly in quality and composition, the quality deteriorating as it reaches the coast. The long narrow belt between the Coleroon and the Cauvery commencing at the Grand Anicut and going right down to Kumbakonam contains the best alluvial soil with a generous mixture of sand. Sandy soil is confined to the coast and river beds, with practically without humus. These soils are very deep, without any stratification due to the result of constant deposition by the rivers, The colour of the soil varies from yellowish brown to brown and the texture sandy loam to clayey loam. Small lime concretions are found scattered throughout the profile. The alluvial soils are deep, fertile and having good drainage. Both calcarious and non-calcarious types are met with. The soil is hard when dry and friable and stocky when moist with a pH range of 8.0. The alluvium may be sandy with very little of clay and practically without humus as in the Maharajapuram reserved land and Pudupattinam where casuarina has been planted and also on sea coast. The soil in the mangroves has a high percentage of dark coloured clay with plenty of organic matter. In the coastal forests of Muthupet, Talainayar and Chatram the soil is of a mixed alluvial type of considerable depth, occasionally with small patches of sand. In consistency it varies from a semi-fluid mud to heavy stiff clay depending upon the period of inundation.

28. *Red ferruginuous soil or lateritic soil.*—The red ferruginuous soils are of the low level type, dark red in colour, fine and rich and are strongly weathered. They are formed out of the Cuddalore sandstones. The brick like red colour is caused by the richness of iron. The pH ranges from 5.4 to 6.7. The soils contain very little of silicate minerals but are mostly dominated by hydrous oxide of iron and alluminium in the clay complex with low silicate/sesqui oxide ratio. These characteristics are chiefly responsible for their poor base exchange capacity, cohesion, shrinkage and expansion. They have extremely high power to fix large quantities of added phosphates in an unavailable form and consequently even if the total quantity of phosphoric acid is more, its availability is much less. These soils are very poor in almost all plant nutrines viz. nitrogen potash, calcium, available phosphorus, organic matter and soluble salts.

29. Red ferruginuous soils are met with in all the cashew areas viz., Neppugai, Komapuram, Melpanakkadu, Sendangudy, Ettiathalai and Kurumbur, etc. The soil is very deep with low water table; often conglomerates are met with these soils. They become loose when wet but harens considerably on drying making it impossible to work with implements. White clay is found underneath these soils at different depths.

30. *Regur or black soil.*—The black cotton soils are formed from a variety of rocks and develop either from the decomposition of the parent rock in situ or from the alluvial deposits derived largely from the weathered rock. These are highly argillaceous heavy soils with low degree of horizonation, black in colour neutral to alkaline in reaction, the pH ranging from 7.2 to 9.0. The clay content constitutes 40 per cent to 60 per cent of the soil. It is often mixed with calcium carbonate, often in the form of kankar nodues which tend to increase with the depht. Kankar often forms hard compact pans obstructing drainage. These soils are highly adhesive, plastic, sticky when wet and become hard on cloddy on drying. Deep cracking, clayey texture, occurrence of scattered lime concretions and sand streaks within the profiles are some of the common features. These soils are very dark, grey brown black in colour with fine strong subangular blocky, structure, etc. Permeability of the soil is very low. They have high water holding capacity but this is, however, counter balanced by high hygroscopic and wilting co-efficients with consequent low moisture availability. It is more fertile than the red soil even though the organic matter content of this soil is low. It contains a considerable quantity of lime, magnesia, potash, iron, alumina but is poor in nitrogen and phosphoric acid. This soil is liable to be easily eroded.

31. Black cotton soil occurs widely near Talainayar, Vadakadu, Thiraikadu, etc.

32. *Arenaceous soil.*—The term arenaceous denotes the sandy soils. This is frequently met with in Aranthangy and Pattukottai taluks. It is characterised by high percolation with low retentivity of moisture. The pH value ranges from 6.5 to 7.0 and as such it is neutral or slightly acidic. The neutrient status of this soil is poor, in respect of major neutrients such as nitrogen, phosphorus and potash. The base exchange capacity is poor in such soil. The soil is deep without much marked differentiation in the profiles. Sandy soil is commonly met with in Udayamarthandapuram and Manamelkudy forests.

33. *Kallar soils.*—Kallar soils are characterised by the presence of soil efflorescence and contain mainly carbonates, sulphates and chlorides of sodium with any of them as chief salt. These soils occur sporadically in patches in the forests of Ettiathalai, Kurumbur, Keeramangalam, Senthangudy and in hollows or swamps of Manamelkudy etc. These are soils which are not conducive to the growth of valuable species.

SECTION 4—CLIMATE AND RAINFALL

34. The Thanjavur division has a healthy warm climate with a prolonged hot summer, characterised by high temperature and a low degree of humidity. The coast is well adapted as a place of resort for convalescents on account of its equable and moderate temperature together with the refreshing coolness of the sea breeze. Point Calimere is much famed for the salubrity and coolness of its climate during the hot months and it is protected from the scorching land winds of the south west monsoon. This locality is perhaps the coolest on the east coast of the Bay of Bengal.

35. Broadly the climate, according to international zonal classification by Begnouls and Gaussen falls to the class 3—xerotheric tropical bioclimate. Legris and Viart have, further subdivided this type and accordingly the climate is called 36th medium tropical transitional bioclimate. This is characterised by monthly temperature always above 27°C, total annual rainfall varying from 500 to 1,500 mm. with a dry period of 5 to 6 months.

36. *Temperature.*—In June when hot winds prevail and the rivers have not yet received their full supply, the heat becomes not a little trying but after this when freshes occur in the river and occasional showers of the south west monsoon begin, the temperature cools down gradually till October. Thereafter with the setting of the north east monsoon the temperature steadily falls till December when it reaches the minimum. The atmosphere continues to be cool till about the end of January. In February and early parts of March the weather becomes moderately warm during days though still cool at nights, with heavy dew falls, but with the later part of March the hot season commence. The increased width of the irrigated land causes more evaporation which makes the country cooler towards the sea. Humidity is very high in the delta region.

37. The average maximum temperature for the district as a whole about 35.2°C and the average minimum temperature is 22.0C. Te maximum temperature reaches rarely over 36.6 C and the minimum touches even 20.9 C. The meteorological data for the Thanjavur district are given in Appendix I.

38. *Winds.*—The south-west wind which sets in during April is strongest in June and continues till September. In October it dies away but at the beginning of November, when the north-east monsoon sets in, it begins to blow afresh till January, though not with the strength of the south west wind. It then drops and by the end of March veers round through the south-east to the south-west again. Along the east coast storms and hurricanes may occur during the months of March to May. Occasionally they may occur in November also.

39. *Rainfall*.—The mean annual rainfall of the Thanjavur district ranges from 850 mm. to 1420 mm. with 51 to 67 rainy days. The annual rainfall varies considerably from place to place and from year to year. It is as low as 855 mm. recorded at Grant Amem and as high as 1418 mm. recorded at Vedaranyam. The number of rainy days vary from 51 days at Grand Anicut to 67 days at Coleroon and Tiruthuraipoondy.

40. The south-west monsoon sets in May or June and continues more or less till September but the rainfall during this monsoon is very much lower than that of north-east monsoon, i.e., more than 60% of the rainfall is received during the north-east monsoon. The north-east monsoon sets in October and continues more or less till December. During the north-east monsoon, the rainfall is more continuous and more copious. The average annual rainfall received at the coastal regions is more than in the inland regions. The period from January to April is usually dry though occasional inter monsoon thunder showers may occur during March to June. In some parts of the division the rainfall is highly capricious and undependable.

41. The average rainfall figures recorded in seventeen well distributed stations are furnished in Appendix I.

42. Although the Thanjavur district has generally a healthy climate, it is by no means free from diseases. The chief among these diseases are diarrhoea, dysentry, fevers and influenza, malaria and filariasis, tuberculosis, leprosy and vinereal diseases, small pox and cholera. Some of these are obviously caused by insanitary conditions, others thrive on ignorance of personal hygine, while some others play havoc due to the inadequate co-operation of the public with the health authorities.

SECTION 5—WATER SUPPLY.

43. There are no important sources of water-supply within the reserved forests. Fresh water is normally obtained from tanks, lakes, streams and rivers as many wells yield only brackish water. Many of the tanks and streams become dry during the summer and remain without water till the outbreak of north-east monsoon and people resort to springs for water supply. Adjoining and within the forests there are few tanks which are rainfed. These tanks and some of the wells built during the panchayat management are the chief source of drinking water to the cattle. Water is available at a depth of about 5 m. and water table goes deeper to 8 to 10 m. or more during summer.

44. Cauvery, Vennar, Vettar, Coleroon, Kudamuruttiar, Arasalar, Tirumalaiajanar and numerous other small streams provide good water supply to the areas served by them.

45. The cashew areas at Ettiathalai, Kurumbur, Keeramangalam, Senthengudy, Neppugai and Komapuram and usually the worst regarding water supply, the whole area being at a relatively higher level with very low water table. Water is available only below a depth of about 25 m. The present condition of the tank at Neppugai indicates the prolonged neglect and it requires adequate and proper bunding and deepening. The few scattered small ponds at Kodaikadu also require deepening and formation of bunds.

46. The water supply to the forest rest house and subordinates' quarters at Point Calimere is inadequate since the departmental well yields only brackish water. Drinking water has to be carried in head loads over great distance from the railway station. The departmental well at Point Calimere requires desilting and other improvements like baling out water at least once in a year.

47. A list of wells and tanks in the division is given below :—

Serial number and location of the well.	*Year of construction.*	*Cost of construction.*	*Maintenance cost.*	*Remarks.*
Wells.				
1 Near the Forester's quarters at Kodiakadu.	1941—42	Rs. 214	Nil.	
Tanks.				
2 Karuthanpallam .. Morsakulan ..	Both situated in Neppugai reserved land.	..	Nil.	In a neglected condition.

SECTION 6—DISTRIBUTION OF AREA.

48. The headquarters of the Thanjavur forest division is at Thanjavur and it consists of one territorial range, five plantation ranges and one range for the implementation of farm forestry scheme in the Government lands outside the forest areas with headquarters at Aranthangi. There are four reserved forests, eighteen reserved lands, seven ex-zamin forests, quite a large number of avenue and 166 compact blocks of teak and other plantations which are scattered all over the district.

	HECTARE
Reserved forests	12,519·66
Reserved land	5,519·55
Forests under other classes (pending settlement)	3,425·52
Total ...	21,464·73

49. A complete list of reserved forest, with the dates of their reservation, particulars of notification and date of taking over by the department is furnished below :—

STATEMENT SHOWING THE RESERVED FORESTS IN THANJAVUR DIVISION.

Serial number and revenue district. (1)	*Name of the reserved forests.* (2)	*Area in ha.* (3)	*Range.* (4)	*Revenue taluk.* (5)	*Name of block and number.* (6)	*Notification number and date.* (7)	*Page in Fort St. George Gazette.* (8)	*Whether finally demarcated or not.* (9)	*Remarks.* (10)
1 Thanjavur	Kodiakadu ..	1843 81	Pattukottai ..	Tiruthuraipoondy	Kodiakadu I	1. No. 188, dated 4th May 1892.	Published at page 598 of Part I of the *Fort. St. George Gazette*, dated 10th May 1892.	Yes.	
	Kodiakadu extension No. I .. No. II .. No. III ..	233 72 10 48 6 96	Do.	Do.	..	No. 475, dated 1st June 1938.	..	Yes.	
njavur	Talayanar ..	1236 29	Do.	Do.	Talayanar	2. No. 451, dated 28th October 1931.	*Fort St. George Gazette*, dated 28th October 1931 Part I page 1424.	Yes.	Under G.O Ms. No. 2276, Revenue, dated 28th October 1931 with reference to notification No. 235, dated 4th August 1888. Published at page 614 of Part I of the *Fort St. George Gazette*, dated 14th August 1888.
3 Thanjavur	Muthupet ..	6803 01	Do.	Do.	Muthupet block	3. No. 98, dated 3rd February 1937.	Published at page 298 in Part I of the *Fort St. George Gazette*, dated 9th February 1937.	Yes.	
4 Thanjavur	Thiraikadu	2936 55	Do.	Do.	Thuraikadu block village No. 135. Thuraikadu.	4. No. II-I, 2940 of 1965, dated 16th June 1965.	Published at page 1815 of Part II Section I of *St. George Gazette*, dated 7th July 1965.	Not.	G.O. Ms. No. 2223, Food and Agriculture, dated 16th June 1965.

STATEMENT SHOWING THE ESTABLISHMENT, BEATS AND SECTION IN EACH RANGE OF THANJAVUR DIVISION.

50. The beats and sections in each range are given below:—

Serial number and name of the beat. (1)	Beat headquarters. (2)	Staff. (3)	Area in ha. (4)	Section name. (5)	Section for which staff sanctioned. (6)	Remarks. (7)
No. 1 Range headquarters, Thanjavur.						
1 Neppugai	Neppugai	1 Forest Guard 1 Watcher	386·25	1. Gandharvankottai.	Forester 1	
2 Komapuram	Komapuram	1 Forest Guard	235·85	2. Thanjavur	Forester 1†	† Forester sanctioned for cashew regeneration in Neppugai R.L. with headquarters at Thanjavur.
3 Saliamangalam	Saliamangalam	1 Forest Guard	17·20	3. Thanjavur*	Forester 1	* Tractor Drivers 2. Cleaner 1. ** 2 Foresters for compact and avenue plantations.
4 Thenparambur	Thenparambur	1 Forest Guard	18·95	4. ,,		
5 Nagathy	Nagathy	1 Forest Guard	14·57	5. ,, **		
No. 2 Range headquarters, Kumbakonam.						
1 Thiruvaiyaru	Thiruvaiyaru	1 Forest Guard	8·46	1.	....	....
2 Valangaiman (N)	Valangaiman	1 Forest Guard	7·84	2.	Forester 1	Sinnanallur
3 Valangaiman (S)	Do.	1 Forest Guard	17·20	3.	Forester 1	Sree kandapuram
4 Nachiarkoil	Nachiarkoil	1 Forest Guard	7·10	4.	....	
5 Swamimalai	Swamimalai	1 Forest Guard	9·25	5.	....	
	Mudikondan	1 Forest Guard*	....	....	....	Special duty Forest Guard for Teak Avenue.
No. 3 Range headquarters, Tiruchirappalli.						
1 Grand Anicut	Grand Anicut	....	5·6	1. Grand Anicut	Forester 1	
2 Mahadhanapuram	Mahadhanapuram	1 Forest Guard	80·0	2. Mahadanapuram	Forester 1	
3 Thimmarayanpuram	Thimmarayanpuram	1 Forest Guard	150·0	3.	....	
4 Nagavalli	Nagavalli	1 Forest Guard	54·14	4.	....	
5 Thirukkattupalli	Thirukkattupalli	1 Forest Guard	80·00	5.	....	
No. 4 Range headquarters, Sirkali.						
1 Maharajapuram	Maharajapuram	1 Forest Guard 1 Watcher	530·90	1. Lower Anicut	Forester 1	
2 Pudupattinam	Pudupattinam	1 Forest Guard 1 Watcher	510·52	2. Coleroon	Forester 1	
3 Sodiakkudy	Sodiakkudy Gopalasamudram	1 Forest Guard 1 Watcher	107·42	3.	....	
4 Alakkundy	Alakkundy Mudalamadugu	1 Watcher	183·01 51·07	4.	....	Plus 1 Forester and 1 Forest Guard for Teak Avenue at Theralandur.
No. 5 Range headquarters, Mannarkudi.						
1 Thattankoil	Thattankoil	1 Forest Guard		1.	....	
2 Kattur	Kattur	1 Forest Guard	109·33	2. Tiruthuraipoondy.	Forester 1	

PATTUKKOTTAI RANGE.

Serial number and name of the Beat. (1)	*Beat headquarters.* (2)	*Staff.* (3)	*Area in ha.* (4)	*Section name.* (5)	*Section for which staff sanctioned.* (6)	*Remarks.* (7)
1 Thamarankottai ..	Maravakkadu ..	1 Forest Guard .. 1 Watcher	529·67	1. **Muthupet**	1 Forester	
2 Chatram	Thoraikkadu	1 Forest Guard .. 1 Reserve Watcher	4636·70	2.	....	
3 Muthupet	Muthupet	1 Forest Guard .. 1 Watcher	6803·00	3.	....	
4 Keeramangalam ..	Keeramangalam ..	1 Forest Guard .. 3 Watchers	973·93	4.	....	Forest Guards. Keeramangalam .. 1 Kurumbur .. .. [illegible] Ettiathalai 1
5 Manamelkudy	Manamelkudy ..	1 Forest Guard .. 1 Reserve Watcher	193·83	5.	Special duty Forester at Manamelkudy.	
6 Talainayar	Talainayar	1 Forest Guard .. 1 Watcher	1236·28	6.	....	
7 Kodiakkadu	Kodiakkadu	1 Forest Guard 1 Special duty Forest Guard. 1 Watcher 2 Checking gate Forest Guards at Agasthiampalli.	1728·81	7. **Kodiakkadu** ..	1 Forester ..	

SECTION 7—STATE OF BOUNDARIES

51. The distinction between reserved forests and the rest of the land is maintained by cleared lines 3.5 to 5.5 metres wide, except where streams, rivers, sea are utilised as boundaries. Stone pillars of 1.5 to 2.0 metres high are placed at angles and intermediate points along the cleared lines. The stone pillars bear the letters "R.F. with an arrow mark above. Owing to the great length of boundary lines and the general indifference of staff, boundaries are not kept regularly cleared. In some places where reserve land bearing some forest growth meet the reserves or patta land and along lines where the reserved forests or ranges or district meet; the demarcation line has not been cleared for years leading to confusion. Discrepancies exist in many reserved lands between the settlement maps and the boundaries as they exist on the ground arising mainly out of the alterations made during the revenue survey and partly due to encroachment also. Similarly in pudugais large variations have occurred owing to constant washing away of the river banks due to floods.

52. It is necessary to take up boundary verification systematically on a phased programme to rectify the difference and to number the cairns according to settlement maps.

53. Boundary pillars have not been numbered serially except in Talaınayar reserved forests. In the mangrove forests some of them are missing or have fallen due to erosion. At Pudupattinam the eastern boundary has not been demarcated and maintained properly though Bay of Bengal forms the boundary.

54. Demarcation on the ground by erecting stone cairn pillars has been done in Muthupet, Talainayar and Kodaikkadu reserved forests and all the reserved lands. In Turaikadu reserved forests demarcation on the ground has not been done.

SECTION 8—LEGAL POSITION

55. The reserved forests of the division are the absolute property of the State subject to the rights and concessions admitted at the time of settlement, and have been declared under section 16 of the Tamil Nadu Forest Act V of 1882. The various rights and concessions admitted are contained in the Fort St. George Gazette notifications relating to each reserve. Reference to number, date and page of the notifications in the gazette has already been given in the list of reserved forests in paragraph 49. Steps should be taken for the reservation of eighteen blocks of forest area which have already been notified under section 4 of the Tamil Nadu Forest Act.

56. The details of the 18 blocks are furnished below :—

AREA NOTIFIED UNDER SECTION 4 BUT YET TO BE NOTIFIED UNDER SECTION 16.

Notification number and date.

Serial number and Range.	*Revenue district.*	*Revenue taluk.*	*Name of the block.*	*Area in ha.*	*G.O. No. in which notified under section 4 of Tamil Nadu Forest Act.*	*Date of publication of section 6 notification in the District Gazette.*	*Remarks.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1 Pattukottai ..	Thanjavur ..	Tiruthuraipoondy.	1 Udayanar-thandapuram.	35·99	G.O. Ms. No. 1847, Food and Agriculture, dated 19th May 1962.	Page 52 of Thanjavur District Gazette, dated 11th July 1962.	..
		Do.	2 Tamarancottai.	529·68	G.O. Ms. No. 26, Food and Agriculture, dated 3rd January 1962.	Page 121 of Thanjavur District Gazette (Tamil issue), dated 11th July 1962.	..
		Do.	3 Vadakadu ..	320·28	G.O. Ms. No. 1792, Food and Agriculture.	Thanjavur District Gazette, dated 11th August 1962 (Tamil issue).	..
		Do.	4 Maravakadu.	1,679·87	G.O. Ms. No. 393, Food and Agriculture.	Not known	Further proceedings stayed by Collector.
		Pattukottai ..	5 Avanam ..	36·28	G.O. Ms. No. 2047, Food and Agriculture, dated 8th June 1962.	Do.	..
		Do.	6 Kothamangalam.	32·11	G.O. Ms. No. 2050, Food and Agriculture, dated 8th June 1962.	Do.	..
		Aranthangy ..	7 Ettiathalai ..	88·18	G.O. Ms. No. 334, Food and Agriculture, dated 5th February 1964.	Do.	..
Plantation Range IV, Sirkali.	Do.	Sirkali ..	8 Pudupattinam Bit I.	282·89	G.O. Ms. No. 2017, Food and Agriculture, dated 6th June 1962.	Page 73 of Thanjavur District Gazette, dated 11th October 1962.	..
			9 Pudupattinam Bit II.	44·63	G.O. Ms. No. 936, Food and Agriculture, dated 6th May 1962.	Thanjavur District Gazette, dated 11th October 1962.	..

Plantation Range IV.	Thanjavur ..	Sirkali	10 Sodiakudy ..	107·42	G.O. Ms. No. 1955, Food and Agriculture, dated 30th May 1962.	Page 74 of Thanjavur District Gazette, dated 11th October 1962.	..
			11 Gopalasamudram.	170·66	G.O. Ms. No. 1844, Food and Agriculture, dated 19th May 1962.	Page 74 of Thanjavur District Gazette, dated 11th October 1962.	Pending with Collector, Thanjavur.
			12 Mudalaimadagu.	51·07	G.O. Ms. No. 935, Food and Agriculture, dated 6th March 1962.	Page 73 of Thanjavur Ditrict Gazette, dated, 11th October 1962.	..
			13 Alakkundy ..	183·01	G.O. Ms. No. 1821, Food and Agriculture, dated 16th May 1962.	Page 72 of Thanjavur District Gazette, dated 11th October 1962.	..
			14 Kattur ..	109·33	G.O. Ms. No. 933, Food and Agriculture, dated 6th March 1962.	Page 75 of Thanjavur District Gazette, dated 11th October 1962.	..
			15 Kodiampalayam.	73·69	G.O. Ms. No. 934, Food and Agriculture, dated 6th March 1962.	Page 73 of Thanjavur District Gazette, dated 11th October 1962.	..
lantation Range I, Thanjavur.	Thanjavur ..	Thanjavur ..	16 Komapuram..	235·85	G.O. Ms. No. 10, Food and Agriculture, dated 2nd January 1962.	Not known	..
		Orathanad ..	17 Neppugai ..	387·25	G.O. Ms. No. 5, Food and Agriculture, dated 2nd January 1962.	Page 195 of Thanjavur Districts Gazette, dated 11th November 1962.	..
		Thanjavur ..	18 Nagavally ..	32·82	G.O. Ms. No. 377, Food and Agriculture, dated 29th January 1962.	Page 194 and 195 of Thanjavur District Gazette, dated 11th November 1962.	

57. The following seven blocks are yet to be notified under section 4 of the Tamil Nadu Forest Act.

AREA YET TO BE NOTIFIED UNDER SECTION 4 OF TAMIL NADU FOREST ACT OF 1882.

Serial number and Range. (1)	*Revenue district.* (2)	*Revenue taluk.* (3)	*Name of the block.* (4)	*Area in ha.* (5)
1 Pattukottai	Thanjavur	Pattukottai	1. Keeramangalam Bit I	6·94
			2. Keeramangalam Bit II	7·58
			3. Senthangudy	273·73
			4. Melpanaikadu	157·24
		Aranthangy	5. Manamelkudy	199·83
		Do.	6. Kurumbur	386·39
2 Plantation Range II Kumbakonam	Do.	Kumbakonam	7. Maharajapuram	82·61
				1114·32

All other classes of forests (i.e. other than reserved forests and reserved land) are lands at the disposal of Government regulated by the application of section 26 of the Tamil Nadu Forest Act of 1882.

58. Compact teak plantations are retained by the Forest Department while the avenue teak plantations have been handed over to the Public Works Department when they are more than three years old.

SECTION 9—RIGHTS AND CONCESSIONS.

59. The various rights and concessions admitted at the time of forest settlement are recorded in the secion 16 notifications relating to each reserve and published in the *Fort St. George Gazette*. These notifications are available in the register of reserved forests which is maintained in the District Forest Office. Rights admitted at the time of forest settlement for right of way etc. are given below. (Vide Appendix II).

RIGHTS ADMITTED IN KODAIKADU RESERVED FORESTS.

60. Path No. 1, 2, 3 and 4 are cart tracks open for men, cattle and carts. Paths No. 5 to 10 are foot paths for men and cattle only.

61. The undermentioned places are demarcated out of reservation and retained as enclosures for the use of worshippers:—

1. The Servaraya Iyenarkoil.
2. A stone Mantapam called Ramaswamipatham.
3. Modiamantapam, an old stone building.
4. The banks of a pond called Arulia Kolam.

62. No rights have been admitted in other reserved forests such as Talainayar, Muthupet and Thuraikadu at the time of reservation. Most of the other customary rights admitted at the time of forest settlement relate to rights of way, access to temples etc.

63. The rights in other forests should be settled at the time of settlement proceedings.

64. Many boats belonging to the fishermen and traders pass through Muthupet reserved forest along the Meru Korayar channel, the lagoon and Vettuvoikkal to reach the sea. It is necessary to declare this as a right of way.

Special rights admitted after reservation in Muthupet reserved forests.

65. Free fishing in the lagoon of Muthupet reserved forest was not recognised at the time of reservation. But subsequently on the representation by the fishermen of Muthupet that they were enjoying free fishing in the lagoon from time immemorial, the privilage was conceded in the lagoon in Muthupet reserved forest under section 18 of the Tamil Nadu Forest Act of 1882 in Chief Conservator's proceedings Miscellaneous No. 136, dated 28th April 1943.

66. No fresh concessions have been admitted during the period of the current Working Plan. The rights and concessions admitted in the reserved forests of the Thanjavur forest division are furnished in Appendix II.

CHAPTER II—THE FORESTS

Section I—Composition and conditon of the crop.

67. The type of vegetation in a locality depends much on the climate, soil and the past treatment. It is rare that the forests has developed to its natural equilibrium under the influence of climate and soil without the interference by external agencies. Agriculture, being the predominant pattern of land utilisation only a small proportion of the land area, less than two per cent, is under forests. In this tract excessive grazing by cattle, indiscriminate clearing for cultivation and illicit felling for fuel and fodder resulted in the degradation and depletion of the forests. The hot climate with low rain fall has limited the vegetation to a dry type with small trees and throny shrubs. The trees rarely attain any great size and they are valuable only as firewood.

68. The forests of Thanjavur division exhibit considerable variation in floristic composition, quality and condition due to climate, physiographic and biotic influences. The edaphic factor is chiefly responsible for the contribution of a complex evergreen type of plant communities called Mangrove forests which are unique along the sea shores in sheltered creeks and lagoons at Muthupet, Chatram, Thalainayar, Vadakadu, Tamarakottai and Thuraikadu, etc., where the soil is stiff clay with poor drainage. But forests of dry evergreen type occur near the sea coast at Kodaikadu and Manamelkudy where the soil is deep and sandy. At Neppugai, Komapuram, Senthamkudi, Keeramanagalam, Ettiathalai and Kurumbur where the soil is of lateritic type the vegetation is of the degraded dry deciduous type.

69. The division is situated in the south eastern corner of the floristic region "II The Dekkam Region" described by Gamble in his Flora of the presidency of Madras and also forms part of the region referred as "III The Semi-desert Region" in the same flora. The coastal belt is called the "Coromandal" in some of the old floras. The flora falls into the 5th (Decan) provinces described by Sir Joseph Hooker in 1904 in his "sketch of the flora of British India". For the description of the various types of forest met with, in this division, the revised classification of the forest types of India by Champion and Seth is adopted. The line of distinction between two types is never markedly abrupt, none the less the types are quite characteristic and distinguishable.

70. The following are the chief types that are commonly met with :—

1. 4A/L1 Littoral forest.
2. 4B Tidal swamp forest.
3. 6A/C1 Southern tropical thorn forests.
4. 6A/C2 Southern carnatic umbrella thorn forests.
5. 7/Ca Tropical dry evergreen forests.

71. Under each forest type the floristics are described under different storeys such as :—

1. Top canopy trees.
2. Second storeys trees.
2. (*a*)Bamboos.
3. Shrubs.
4. (*a*) Herbs.
4. (*b*) Grasses.
5. Climbers.

Epi—Epiphytes.

Par—Parasites.

72. The following abbreviations indicate the quantum and frequency of occurrence of a particular species :—

- (*va*) Very abundant.
- (*a*) Abundant.
- (*f*) Frequent.
- (*c*) Common.
- (*o*) Occasional.
- (*r*) Rare.
- (*la*) Locally abundant.
- (*lc*) Locally common.

4*A*/*L*1 *Littoral forests* :

73. These forests are confined around the coast wherever a fair width of sandy beach occurs including sandy bars on the sea face of the river deltas. The habitat near Pudupattinam and Manamelkudy is an exposed one with pronounced characteristics. The soil is sea sand often blown and occumulating in low dunes with adequate lime from shell fragments but poor in nitrogen and mineral nutrients. It is very coarse, porous and dry at the surface with the water table only a few metres down. The water is often brackish. Strong winds often salt laden act as dessicating agents with strong insolation and radiation from the base sand rendering conditions pronouncedly xerophytic. The temperature is moderated by the proximity of the sea and by sea breezes. Rainfall varies from 1200 mm to 1400 mm.

74. Scattered smaller evergreen trees occur which form the dominent canopy in the absence of Casuarina. There are numerous shrubs and the undergrowth comprise light maritime grasses (Spinific, etc.) with surface creepers binding the sand.

75. The floristics of this type are :—

I/II. *Top canopy/Second storey.*

Calophyllum inophyllum	(*c*)
Syzygium cumini.	(*vf*)
Cassia fistula	(*r*)
Barringtonia acutangula.	(*c*)
Premma latifolia	(*r*)
Pongamia pinnata	(*r*)
Thespesia populnea	(*r*)
Trewi Anudiflora	(*r*)

III. Shrubs :

Clerodendron	(*c*)
Cassia auriculata	(*f*)
Pandanus tectorius	(*f*)
Vitex h undo	(r)
Jatropha gossypifolia	[illegible]
Opuntia elatior	(*c*)
Catharanthus roseus	[illegible]

IV a Herbs :	
Ipomaea pescaprae	(f)
Sesuvium portulacastrum	(c)
Evolvulus alsinoides	(c)
Mollugo disticha	(f)
Mollugo mudicaulis	(c)
Mollugo cerviana	(c)
Lippia modiflora	(c)
Blumea amplectens	(c)
Merremia tridentata	(c)
Enicostemma verticillatum	(c)
Hybanthus ennea spermus	(f)
Pol lachinensis	(c)
IV b Grasses :	
Cyparus arenarius	(la)
Era rostris tremula	(r)
Scienifix littorens	(lc)
V Climbers :	
Abrus precatorius	(c)
Cissus quadrangularis	(f)
Cissampelos pariera	(r)

76. Natural regeneration is absent in this type of forests since the soil is exposed one with pronounced xerophytic condition where salt laden wind often flow. Further intensive grazing by cattle from the numerous nearby villages creates a condition inimical to the germination of seed and establishment of natural regeneration.

77. *Artificial regeneration.*—Plantations of Casuarina have been raised both by agriculturists as well as by Forest Department all along the sandy areas along the sea shore, the majority being private plantations.

4B Tidal swamp forests :

78. Tidal forests or Mangroves are a complex of evergreen plant communities found as a belt of varying width along the tropical shores of sheltered creeks, lagoons, deltas and islands below the high tide mark. These edaphic communities are the result of the constantly changing conditions brought about by river deposits, formation of sand bars, lagoons, etc. Mangrove spicies at times may extend beyond the level of the highest tides. Mangroves are perhaps the most remarkable of all examples among plants of epharmonic convergence.

79. The rainfall in these areas is between 1200 mm and 1400 mm per annum. Though the climatic factors are not in any away different from the nearby localities with different vegetations, the chief factor peculiar to the mangrove is the edaphic factor.

80. The soil is an alluvial clay of considerable depth; occasionally with small patches of sand. In consistency it varies from a semifluid mud to heavy stiff clay depending upon the period of inundation. The vegetation thrives under a water logged condition where soil aeration is very defective. The presence of sodium chloride as well as free water in the soil produces varying degrees of salinity which is a very important factor peculiar to the mangroves.

81. The mangroves are distributed in well defined zones. Four zones can be recognized according to inundation. They are :—

(*a*) The zone which is between the daily high tide and low tide marks.

(*b*) The zone which gets inundated only during the equinoctial tides.

(*c*) The zone which is inundated only during the monsoon season.

(*d*) The zone which never gets inundated at any time.

82. The first zone which borders the forest is occupied by *Rhizophora candelaria Acanthus ilicifolius, Legiceros cormiculatum.* Though all the species form gregarious patches, here and there they form associations with one or more of the species of this zone. *Excoecaria agallocha* may be found occasionally in this zone.

83. The second zone comprises an association of several species like *Avicennia officinalis, Avicennia alba, Excoecaria agallocha. Halophytic* herbs occur as an undergrowth in areas where the mangroves are spare.

84. The third zone is usually dominated by the *halophytic herbs* almost exclusively. There may be a few stunted plants of *Avicennia* here and there. In places where the salanity is high, there are blanks without any plant.

85. The fourth zone is occupied by a low scrub jungle consisting of *Dichrostachys cinerea, Acacia sundra, Cassia auriculate Parkinsonia aculeata, Clerodendron inerme, Azima tetracentha, Crateava religiosa, Grewia asiatica, Azadirachta intioe, Pongamia pinnata, etc.* It is interesting to note that most of the species are halophilous. *Excoceria* may occur at the lower fringes. In places where there is accretion of sand *Pandanus tertorius* and *Spinifiel aquarrosus are found. In depressions*, where the salt water does not enter, are found though rarely *Syzygium cumini* and *Terminalia arjuna.*

86. In the tidal swamps the following forest types occur :—

(*a*) 4B/TS1 Mangrove scrub.

(*b*) 4B/TS2 Mangrove forest.

4B/TS1 Mangrove scrub :

87. Mangrove scrubs are mainly confined all along the fringes of lagoons and islands of Talainayar, Muthupet, Vadakadu, etc. This is more or less a low dense forest rarely 5 m. tall often reduced by biotic agencies. The species are very few in number and markedly gregarious, all evergreen with entire leathery leaves. This type is found a little farther away from the Mangrove forests towards the interior parts of islands. It is far more extensive than the Mangrove forest and is subject to inundation with salt water. There are large areas containing no tree species but occupied by the *halophytic* plants like the species of *Suaeda, Sessuvium arthrocnemum* and *Salicornia.* Young regeneration of *Avicennia marina* is usually found in these areas. Climbera are generally absent.

88. The floristics of this type are—

I/II *Top canopy/Second story :*	
Avicennia Officinalis	(c)
Avicennia marina	(c)
Exceocaria afallscha	(f)
Lumnitzera racemosa	(c)
III *Shrubs :*	
Acanthus ilicifolius	(vf)
Cariops roxburghiana	(r)
Clero endrum inerme	(f)

IV *a. Herbs :*

Suaeda maritima	
Suaeda monsica	(f)
Sesuvium portula castrum	(r)
Salicornia luacteata	(c)
Arthrochemum fruticosum	(i)
Aschaneminae indica	(r)

V *b. **Grasses :***

Fimbristylist polytrichoides	(la)

4B/TS2 *Mangrove forests :*

89. This type is found all along the fringes of lagoons and islands of Muthuper, Chatram, Talainayar, Tamaramkottai, etc. This is typically a closed evergreen forest of moderate height upto 10 m. composed of trees specially adapted to survive on tidal mud which is permanently wet with salt water and submerged at every tide.

90. Floristics of this type are— —

I/II *Top canopy/Second storey :*

Rhizophora candelaria	(r)
Rhizophora mucronatta	(r)
Avicennia officinalis	(vf)
Avicennia alba	(f)
Excoeceria agallocha	(f)
Lumnitzera recemosa	(c)
Ceriobs roxburghiana	(r)
Bruguiera cylindrica	(r)
Sonneratia apetala	(r)

III *Shrubs :*

Clercaencion irorme	(f)
Aeeiceras corniculatum	(c)
Acanthus ilicifolius	(la)
Azime chatracantha	(c)

V *Climbers :*

Delber ia spinosa	(r)
Derris trifoliata	(c)

Parasites :

Viscus capitellatum	(c)
Cessytha filiformis	(f)

91. The mangroves are remarkedly adapted to the peculiar edaphic factors of the locality. Stilt roots characteristic of the species of rhizophora also seen in *Achanthus* ***ilicifolius***. The species of Avicennia possess negatively geotropic roots called the pneumatophores which grow above the soil and water level. Though these pneumatophores have so far been considered as only organs of respiration recent works indicate

that the most important function of these roots is to ensure a constant supply of absorbing roots just below the soil which tends to rise due to silting in addition to providing a means of gaseous exchange. The leaves are thick and leathery with thick cuticle, water storage tissues, deeply seated chlorenchyma and salt secreting glands. The number of stomata per unit area is unusually high in most of the mangroves. The fruits are dispersed by water as they are able to float for a number of days without deterioration and vivipary is a common feature of the majority of the species.

92. There had been diverse opinions regarding the ecological status of mangroves. Stamp and Burtt Davy considered mangroves as climatic climax whereas Tanseley and Chipp preferred to assign the status of edaphic climax. Champion placed the tidal forests under primary seral types of the moist tropical seral formations.

Scrub jungles :

93. Inside the mangrove area at Tamaramkottai, Thuraikadu is on the elevated land above the inundation zone. Here occurs a kind of scrub jungle which is a combination of both 6A/DS1—Southern thorn scrub and 7/DS1—Tropical dry evergreen scrub.

This is more or less open low forest with dense bushes and climbers and occasional trees.

Floristics.

I/II. *Top canopy/Second storeey* :	
Dichrostachys cinerea	(c)
Crataeva religiosa	(r)
Norinda tinctoria	(r)
Pongamia pinnata	(c)
Parkinsonia aculeata	(r)
Manilkara littoralis	(r)
Acacia arabica	(la)
Atlantia monophylla	(r)
III. *Shrubs.*	
Azima tetracantha	(c)
Cassia auriculata	(la)
Clerodendrum inerme	(vf)
Gmelina asiatica	(r)
Jatropha glandulifera	(c)
Opuntia dillenii	(la)
Memecylon umbellatum	(r)
Gymnosporia emarginata	(r)
Securinega virosa	(r)
IV. *a. Herbs—*	
Genio sporum tenuiflorum	(r)
Borreria articularis	(c)
Cressa cretica	(c)
V. *Climbers—*	
Cissus quadrangularis	(f)
Asparagus racamosus	(c)
Tinospora cordifolia	(r)
Cocculus hirsutus	(r)

Natural regeneration :

94. Natural regeneration from seed is satisfactory for many of the mangrove species (such as *Rhizophora*, *Excoecaria*), etc., in areas subjected to innundation or free from the dense growth of *Acanthus ilicifolious* and species of *Suaeda*, under favourable conditions when there is no biotic factor operating. All species regenerate naturally from seed or viviparus sedlings which are dispersed by water.

95. The chief factor militating against the establishment of the mangroves especially *Avicennia* which is an important economic plant is unrestricted grazing. *Avicennia* being widely eaten by cattle is repeatedly browsed with the result it seldom grows above 2 m. in height. Stunted stems of *Avicennia* can be seen in such areas.

96. *Avicennia* is coppicing profusely as seen from the felled coupes in Muthupet reserved forest. Artificial regeneration with suitable species wherever possible is very essential to improve the stocking along the fringes of lagoons, etc., and in the open patches.

6A/C1. *Southern tropical thorn forests :*

97. The thorn forests are mainly confined to the plains and ex-zamin forests of Kurumbur, Ettiathalai, etc., receiving an annual rainfall of 900 mm. to 1,200 mm. The forest is more or less an open one, the overwood consisting of medium sized trees. Stunted specimens of the trees of the dry deciduous forest occur scattered in varying number throughout amidst the *Acacias*, thorny *Mimoseae* and *Zizyphus*. The trees usually have short boles and low branching crowns which rarely meet and never exceeds 5 m. height. There is an ill-defined lower storey of smaller trees and large shrubs, mostly spiny and often with xerophytic characters. There is usually thin grass growth which appear fairly complete during the short moist season. Climbers are few, also frequently showing xerophytic adaptations. Thorny *Zizyphus* and flushy *Euphorbias* are generally present and form a conspicuous constituent of the vegetation. *Opuntia* though not indigenous has become naturalised over wide tracts at the ground level. *Capparis* is also a typical genus. The soil is generally thin, shallow and stony.

98. The floristics of this type are—

I/II. *Top storey/Second storey :*

Albizzia lebbeck	(c)
Albizzia amara	(f)
Albizza odoratissima	(c)
Acacia leucophloea	(f)
Zizyphus mauritiana	(c)
Acacia sundra	(f)
Acacia ferruginea	(c)
Acacia senegal	(r)
Azadirachta indica	(c)
Lannea coromandelica	(r)
Chloroxylon swietemia	(f)
Commiphora caudata	(o)
Cassia fistula	(r)
Atlantia monophylla	(f)
Zizyphus xylopyrus	(f)
Cleisthanthus collinus	[illegible]

Canthium dicoccum	(c)
Dichrostachys cinerea	(f)
Maytenus emarginata	(r)
Acacia latronum	(r)
Cordia monoicam	(c)
Wrightia tinctoria	(c)
Commiphora herryi	(r)
Gyrocarpus jacquini	(r)
Strychnos nux-vomica	(vf)
Bauhinia racemosa	(r)
Dalbergia paniculata	(c)
Erythroxylon tomentosum	(r)
Pouteria tomentosa	(r)
Commiphora berryi	(r)
Vitex altissima	(r)

III. *Shrubs*—

Carrisa congesta	(vf)
Carrisa spinasum	(f)
Phus mysorensis	(r)
Dodonaea viscosa	(vf)
Randia dumetorum	(vf)
Securinega laucopyrus	(c)
Opuntia elatior	(c)
Grewia hirsuta	(o)
Cadata fruticosa	(o)
Capparis sepiaria	(f)
Cassia auriculata	(vf)
Kirganelia reticulata	(r)
Solanum pubescens	(c)
Calotropis procesa	(o)
Jasminum rigidum	(c)
Webra corumbosa	(c)
Memecylon umbellatum	(c)
Baleria prionitis	(r)
Pavetta indica	(vf)
Helicteres isora	(c)
Holarrhena antidysentenica	(r)
Flacomtra indica	(f)
Carrisa opeca	(c)
Gymnosporia emarginatus	(c)
Fluggea microcarpa	(r)
Glycosmis cochinchinensis	(r)
Clerodendron serratum	(c)
Phoenix acaulis	(vf)
Ehretia laevis	[illegible]

IV. a. *Herbs*—

Tricheaisma indicum	(r)
Scutia circumoissa	(r)
Lecas aspera	(c)
Tephrosia purpurea	(f)
Ocimum americanum	(c)
Indigofera tinctoria	(c)
Barleria buxifolia	(o)
Mimosa pudica	(c)
Cassia tora	(f)
Cassia occidentalis	(vf)
Desmodium triflorum	(o)
Grewia hirsuta	(c)
Hibuscus imicranthus	(c)
Emblica officinalis	(c)
Phyllanthus simplex	(c)
Polygala tranquebarica	(c)
Waltheria indica	(c)
Alysicarpus monilifer	(c)
Corchorus acutangulus	(c)
Blumee obliqua	(c)
Dipteracanthus prostratus	(r)
Dicerma biarticulatum	(r)
Aerva lanatta	(r)
Achyranthus aspera	(r)
Sida cordifolia	(la)
Boerhavia diffusa	(c)
Ionidium leptorhizum	(c)
Tridax procumbens	(c)
Justicia diffusa	(r)
Abutilon indicum	(r)
Sabira plebeia	(r)
Spermacoce hispida	(c)
Polycarpaea corymbosa	(c)
Phaseolus trilobus	(c)

IV. b. *Grasses*—

Heteropogon contortus	(c)
Aristida depressa	(c)
Cynodon dactylon	(f)
Cenchrus citiaris	(f)
Imperata cylondrica	(c)
Eleusine indica	(c)
Themeda triandra	(c)

V. Climbers—

Acacia pennata	(c)
Pterolobium indicum	(f)
Toddalia aculeata	(o)
Abrus precatorius	(c)
Combretum latifolium	(c)
Cenhalandra indica	(r)
Cissus quadrangularis	(c)
Acacia instia	(f)
Derris scandens	(c)
Asparagus racemosus	(f)
Vitis carnosa	(c)
Tylophora indica	(c)
Zizhyphus oenophlia	(c)
Tinospora cordifolia	(r)
Cissampelos convolvulacea	(c)
Smilaz ovalifolia	(c)
Cassyth filirormis	(r)

99. Epiphytes are generally absent. Stem parasites such as *Loranthus viscum*, etc. are fairly common.

100. In the plains forest skirting villages and towns the ecological succession has either been arrested or reversed due to its easy accessibility and consequent vulnerability to the biotic influences in the form of indiscriminate hacking, theft, heavy grazing, etc. The result is a deteriorated condition, the forest being mostly of the "dry scrub type" carrying stunted and ill developed stand of trees of little or no importance. In fact the following degraded stages are more commonly met with than the original type of forest.

A. 6A/C2/DS1—Southern thorn scrub.
B. 6A/C2/DS2—Southern euphorbia scrub.

6A/C2/DS1—Southern thorn scrub :

101. This is a degraded stage of the thorn forest due to maltreatment resulting in the formation of close, almost impenetrable thorny thickets 4–6 m high, not much different from the undergrowth characteristic of the prevailing climax type, in which the few surviving trees stand out here and there. Spiny climbers are common. Further degradation has resulted in sparse thickets, 2-4 m high, in which grasses are more abundant. The floristic composition remains essentially unaltered.

Floristics :

I/II *Top canopy/Second stores—*

Albizzia amara	(f)
Azadirachta indica	(r)
Chloroxylon swietenia	(c)
Wrightia tinctoria	(r)

III. *Shrub—*

Zizyphus xylopyrus	(c)
Dichrostachys cinerea	[illegible]

Zeromphis spinosa	(c)
Canthium dicoccum	(c)
Flacourtia indica	(f)
Capparis sepiaria	(c)
Carrissa spinarum	(vf)
Euphorbia antiquorum	(c)

V. *Climbers*—

Pterolobium indicum	(f)
Acacia pennata	(c)
Hemidesmus indica	(c)
Jacquemontia paniculata	(c)

Such type of forests occur at Komapuram, Neppugai and Senthengudi.

6A/C2/DS2—Southern euphorbia scrub :

102. This forest type occurs over extensive areas in the plains at Keeramangalam and Ettiathalai. This type is found often side by side with the previous type—southern thorn scrub. The forest assumes a very open and stunted character in which fleshy *Euphorbias* are the most important constituents. The thorny *Acacias* and their associates also occur but are more than stunted and form widely spaced low rounded bushes. Much of the soil is bare but there is usually a thin cover of grasses.

Floristics of this type are—

I. *Top Storey*—

Euphorbia tirucalli	(f)
Euphorbia antiquorum	(vf)

II. *Second storey*—

Dodonea viscosa	(f)
Cassia auriculata	(c)
Opuntia dillenii	(c)
Calotropis gigantea	(r)
Barleria buxifolia	(r)

IV b. *Grasses*—

Cymbopogon coloratus	(c)
Heteropogon contortus	(c)
Aristida hystrix	(f)

V. *Climbers*—

Cissus quadrangularis	(f)
Hemidesmus indica	(c)

103. Most of these areas have been converted into cashew plantations but the vegetation occurs in a diminutive form in the unplanted areas and uncleared portions in between cashew at Melpanikadu.

Natural regeneration :

104. Owing to the proximity of numerous villages these areas are intensively grazed and the soil in consequence is exposed and rendered barren in patches. The surface has become hard and caked, a condition inimical to the germination of seed and establishment of regeneration. Hence natural regeneration of valuable species is generally far from satisfactory in this class of forest. Artificial regeneration is therefore very essential to improve the stocking.

Artificial regeneration :

105. Planting up with cashew as commercial crop has been taken up in these areas since 1956 under various five-year plans and the results are striking where kumri method of regeneration was employed. The details of the regeneration work done are given in Chapter V.

6A/C2—Southern carnatic umbrella thorn forest :

106. This is one of the important forest types in this region as it contains species that are highly valued as fuel. The stand is typically open and thorny in which *Acacia planiforns* with its umbrella shaped crown is conspicuous with thickets of other species of Acacia and many of the xerophytic evergreen species of the dry evergreen forests. Dry edaphic conditions result in the development of this type.

The floristics of this type are as follows :—

I. *Top storey—*

Acacia planifrons	(vf)
Albizzia amara	(f)
Chloroxylon swietenia	(c)
Givotia rottleriformis	(r)
Borassus flabellifer	(vf)
Gmelina arborea	(f)
Gyrocarpus jacquini	(r)
Zizyphus mauratiana	(r)

II. *Second storey—*

Calophyllum inophyllum	(c)
Acacia latronum	(f)
Dichrostachys cinerea	(c)
Cassia fistula	(r)
Atlantia monophylla	(r)
Canthium dicoccum	(c)

III. *Shrubs—*

Randia dumatorum	(c)
Carris a carandus	(f)
Carrissa spinarum	(f)
Barleria acuminata	(r)
Phoneix acaulis	(vf)
Acalypha fruticosa	(r)
Zizyphus rugosa	(c)
Euphorbia antiquorum	[illegible]

V. *Climbers*—

Lippia mudiflora	(c)
Cressa critica	(c)
Mullugo disticha	(c)
Tribulus terrestris	(c)
Launaea pinnatifide	(r)
Evolvulus alsinoides	(r)
Merremia tridentata	(c)
Gisekia pharnaceoides	(c)

IV. b. *Grass* (scanty)—

Spinifix squarrosus	(c)
Cynodondactylon	(c)
Aristida depressa	(c)

V. *Climbers*—

Pterolobium indicum	(c)
Acacia pinnata	(f)
Asparagus racemosus	(f)
Jasminum arborescens	(r)
Ipomea bilobia	(c)

107. In Manamelkudy forests the occurrence of Ficus species as Epiphytes on Palmyrah trees encircling the whole stem and sometimes even killing the host plant is a common feature.

Natural regeneration :

108. Coppice regeneration and natural regeneration by seeding are satisfactory especially in the case of *Acacia planifrons, Albizzia amara.* There is profuse natural regeneration of *Borassus flabellifer* even though grazing by cattle is a menace to the regeneration and establishment of the same.

Artificial regeneration :

109. Part of the area is converted into coconut plantation as the soil is sandy which is quite suitable for raising coconut as well as casuarina.

7/C1—*Tropical dry evergreen forest* :

110. This type is found in coastal regions of Kodiakadu and Manamelkudy where the soil is deep and sandy. It is a low forest 7 to 10 m. high but forming a complete canopy consisting mostly of small coriaceous leaved evergreen trees with short boles and spreading crowns. The proportion of the deciduous species may be large locally. There is no marked differentiation of canopy layers between the shrubby underwood which includes many spiny species and the top canopy. Climbers are numerous. Bamboos are absent. Grass is present but not conspicuous. Most of the forests have been much influenced by felling, lopping and browsing and have become irregular with open patches. The thorny and unpalatable species have largely displaced the climax vegetation. This forest is characterised by the presence of dominants with low coppicing power. The most conspicuous species are *Manilkara hexandra, Manilkara elengi,* ***Memecylon edule,*** *Sapindus emarginatus,* etc.

The floristics of the type are as follows :—

I/II. *Top canopy/Second storey* :—

Manilkara hexandra	(f)
Ficus retusa	(r)
Ficus sibbosa	(r)
Manilkara elengi	(c)
Lepisanthes tetraphylla	(r)
Syzygium cumini	(c)
Putranjiva roxburghii	(c)
Strychnos nux-vomica	(c)
Strychnos nux-vomica	(c)
Sapindus emarginatus	(c)
Albizzie amara	(r)
Madhuke latifolia	(c)
Tamarindus indica	(r)
Cassia fistula	(c)
Salvadora indica	(c)
Diospyrus montana	(r)
Maba buxifolia	(c)
Inga dulcis	(c)
Holarrhena antidysenterica	(c)
Streblus asper	(c)
Dischopis elliptica	(c)
Isonandra lanceslata	(r)
Sideroxylon tomentosum	(c)

III. *Shrubs*—

Memecylon edule	(f)
Memecylon umbellatum	(c)
Maba buxifolia	(r)
Webera corymbosa	(c)
Pavetta indica	(f)
Dodonia viscosa	(vf)
Calotropis gigantea	(c)
Drypetes sepiaria	(c)
Carrissa opaca	(c)
Cassia auriculata	(la)
Erythroxylon monogynum	(r)
Ixora arborea	(c)
Azimatetracantha	(c)
Hugonia myystax	(r)
Gmelina parvifolia	(c)
Glycosmis cochinchinensis	(c)
Canthium parviflorum	(c)

IV a. *Herbs* :

Solanum trilobatum	(r)
Evolvulous alsinoides	(c)
Merremia tridentata	(c)
Oldenlandia umbellata	(c)
Blepharis boerhaaviaefolia	(r)
Cassia kleinii	(r)
Pavonia zeylanica	(c)
Asystasia gangetica	(c)
Zormia diphylla	(c)
Synostemon bacciforme	(r)
Barleria prionitis	(r)
Biophytum sensitinum	(r)

IV b. *Grasses* :

Fimbristylis polytrichoides	(c)
Aristida depressa	(c)
Aristida byotrex	(c)
Cyperus difformis	(c)
Cynodon dactylon	(c)
Cyperus costaneus	(c)

V. *Climbers* :

Acacia instia	(f)
Pterolobium indicum	(c)
Derris scandens	(c)
Asparagus racemosus	(f)
Tinospora cordifolia	(c)
Leptadenia reticulata	(r)

111. In addition to the natural forests described in this chapter the division contains extensive plantations of teak on the fringes of rivers and canals, cashew in ex-zamin forests, casuarina on the padugais and poromboke lands. Coconut topes, plantations of Eucalyptus, Bamboo, Dalbgegia sissoo and other miscellaneous species, etc., distributed over a wide range of localities. These plantations are discussed in detail in Chapter V.

112. Farm forestry plantations have been raised in lake beds and lake foreshores under the Five Year plans. Some of the canal bank plantations raised by the Thanjavur forest division lying in Cauvery ard Coleroon padugais are now maintained by the Tiruchirappalli forest divison.

***Botanical list* :**

113. A list of trees, shrubs, herbs and climbers found in this division is furnished in appendix III.

SECTION 2—INJURIES TO WHICH THE CROP IS LIABLE

114. Damage to forest is caused both by natural causes and by human agency. The important causes of damage to the mangroves are wind, rise of ground level, change of water course, erosion, grazing, insects, climbers, parasites and human activities.

115. *Wind.*—This division experiences strong winds which accelerates desiccation. Such wind causes damage to the young casuarina regeneration if they are not staked till they sufficiently strike root in the ground. The effect of the wind is pronounced in that it stirps off the crown portion of the casuarina seedlings resulting in branchiness and dwarfness and top drying along the sea shore. Further it bends the trees and causes the formation of eccentric and unequal crown. The prevalance of salt laden winds along the coastal area inhibits the establishment of casuarina regeneration. The hot desiccating winds from the inland during the hot weather in the months of April to June causes death to younger seedlings in the plantations. Large quantity of sand are deposited in the mangroves during strong winds which bury the trees to a considerable height which is a common feature near the sea shores.

116. *Cyclone.*—Though they are occassional they cause considerable damage to the forest and plantations by uprooting the trees.

117. The whole of Muthupet and Chatram forests were overrun by the sea and were submerged to a depth of 2 m. for a fortnight during the cyclone of November 1952, which was accompanied by a tidal wave. As a result of this most of the pneumatophores of the principal speciés *Avicennia officianalis* have died over large areas. With the recession of salt water the young growth below 3 years, a few large trees in the older crops and the growth on narrow belts along the creeks have however survived this onslaught. The great majority of the trees however died completely during that cyclone.

116. *Cyclone.*—Though they are occasional they cause considerable damage to the plantations by erosion of banks and washing away of soil along with rows of Casuarina plantations raised in the banks of Cauvery. Silt deposition is a continuous process and mangroves thrive only so long as the site is within the inundation zone. Silting is accelerated during strong floods which bring a heavier silt load. Once the ground is raised beyond the equinoctial tide zone the vegetation is gradually replaced by other land communities.

119. *Erosion.*—Along the stream banks while silting may be taking place on one bank, erosion may be taking place on the other bank due to fast currents. Often soil along with vegetation is carried away. New accretions and erosions are a common sight in Padujars, Sodiakudy, Gopalasamudram, Alakkudy, Mudalaimadagu and at Maharajapuram, etc. The chief sources of erosion are floods, strong water currents and change of course of rivers, etc., in their direction of flow.

120. *Drought.*—Sometimes causes mortality in the casuarina plantations in the padugais and coastal areas. Apart from the desiccation of the soil and water table going down deep, the growth of casuarina plants is retarded. Large scale mortality may occur due to drought when there is failure of monsoon.

121. *Wild animals.*—Rodents cause damage to the cashew regeneration since they eat away the cashew seeds dibbled in the regeneration areas. Nibbling of young cashew seedlings by hares is a common feature in the forests of Avanam, Komapuram, Neppugai, etc.

122. The so called semi wild cattle, which are really village cattle which are let loose to roam about day and night not accompanied by graziers do considerable havoc to the regeneration of Alavathy in Muthupet reserved forests since they are avidly eaten by them. *Avicennia* is repeatedly browsed by cattle with the result it seldom grows above 2 m. height.

123. The spotted deer and black buck in Kodiakadu reserved forests browse the tender coppice shoots and seedlings while the wild boars dig up even the very roots. Ponies that are bred near Point Calimere and allowed to run wild in Kodiakadu reserved forests are a source of menace to the natural regeneration.

124. *Injuries caused by plants.*—Creepers and climbers are seen in young cashew regeneration area as well in Teak plantations though the damage caused by them is insignificant. It is not uncommon to find the crown of old cashew plants completely enveloped by climbers. The species of climbers that usually affilict the trees are :—

(i) *Pterolobium indicum*
(ii) *Zizyphus oenoplia*
(iii) *Acacia instia*
(iv) *Acacia pennata*
(v) *Hemidesmus indica*

125. The thorny *Acacias* and *Plerolobium indicum* besides shutting out the sunlight, the dead weight of the climbers sometimes overpowers the smaller trees, resulting in breakage of the upper branches. *Loranthus, Viscum agnulatum* and *Cuscuts* are the common parasites seen in cashew areas.

126. Injurious plants like *Prosopis juliflora* invade the plantations and forests and suppress the growth of other valuable tree species. The casuarina plantations near Alakudy are repeatedly overrun by aggressive *Prosopis* growth. Though *Prosopis* is clearfelled and uprooted before taking up these areas for planting, the weed re-appears unabated vigour. In mangrove areas *Acanthus ilicifolius* (Mulli) is a pest on the banks on streams which cannot be controlled by cutting back since it comes up vigorously throwing fresh shoots. Uprootal is a costly operation. The mangrove trees, especially *Excoeccaria agallocha* are badly infested by the parasite *Viscum*. *Cassytha filliformis* and *Cuscuta reflexa* are other parasitic plants occurring in the mangrove forests. *Derris trifoliata* is a very *aggressive* climber which is seen smothering even large trees and inhibiting their growth. *Lantana camera* is also frequently observed in plantations and openings, especially in Gopalasamudram and Sodiakudy.

127. *Insects and diseases.*—The following are some of the insects known to cause injury to the casuarina plantations although the damage is not serious.

Crickets:

128. *Erachytripes potentous.*—This large blackish brown cricket 5 cms. long, nocturnal in habit, remains hidden by day and comes out in night in search of food and carries meedles to its burrow. By day it remains in the burrow and feeds on the needles collected at night. Seedlings in the nurseries and young transplants below 60 cms. are liable to be attacked by this insect.

129. *Lecauim longulum.*—This is a scale insect occurring in the bank covering almost the whole plant. The younger seedlings succumb to the attack while the older ones manage to survive. The insect hibernates within a small oily shell giving a blackish appearance to the plant. Spraying the plants with fish oil resin soap solution (at a strength of 100 gms. in 50 litres of water) is quite effective agains this pest.

130. *Arbella letraomis.*—This is a borer attacking the casuarina plantations but the damage is very insignificant.

131. *White ants.*—The attack is commonly found in the nursery and in the young casuarina plantations causing mortality to the seedlings. Since the attack is mostly confined to the root portion application of BHC 10 per cent to soil before sowing the seeds in the nursery and while planting found to be efficacious.

Fungus:

132. *Trichosporium vesiculesum.*—Stray cases of attack by this fungus were noticed in the casuarina plantations in dead patches. Such attacked trees are extracted and burnt immediately which is the only remedial measure against this fungus.

133. Damage to cashew plantation by *Acrocercops syngramma* (leaf minor) *Macalla* spp. (leaf webber) and other insect pests is almost an annual feature. Crickets, scale insects, hairy caterpillars cause damage to young seedlings in the nurseries and young plantations. A detailed account of pests and diseases in cashew and casuarina is furnished in appendix IV (a) & (b).

134. *Diseases in coconut.*—The coconut palm is affected by a number of diseases which are responsible for enormous economic losses. The coconut palm is prone to diseases such as bud-rot, false bud rot or lightning injury affecting the buds. Diseases affiecting the leaf are leaf rot, litton leaf diseases, petiole rot, leaf break disease, leaf blight, bacterial leaf blight, leaf drop or leaf fall. Diseases affecting the stem include stem bleeding and that of root is by a fungus called Ganoderma lucidum. Wilt diseases such as tapering stem wilt, bronze leaf wilt, etc., are not uncommon. The details of various other diseases with their symptoms and various control measures suggested are described in appendix IV (c).

135. *Human agency.*—Since the forests are adjoining the villages and are interpersed with numerous enclosures of cultivation, there is considerable and recurrent reaction of man on the forests.

136. Man is largely responsible for the deterioration of the mangrove and other forests due to his illicit cutting. Greater damage is done by the cattle which are let loose by the villagers in the mangrove forests from August till March since they eat away the seedlings and thus prevent establishment of natural regeneration. Since the advent of the Pamini straight cut project to prevent silting and improvement of drainage a considerable area of forest land has been lost in Vadakadu reserved land due to clearing away the jungle in the formation of channel and flood banks on either side.

137. *Fires.*—Fire is a rare phenomenon in this division as the ground cover is scarce and the damage to the forest is negligible. Fires if any are mostly incendiary or due to the negligence of man. Details of occurrence of fires are furnished in paragraph 474.

138. *Theft.*—The absence of adequate trees, the proximity and easy accessibility to the forests from the village, poor economic condition of the people, the unfettered freedom enjoyed by the villagers in these forests during the Forest Panchayat regime are the factors responsible for the illicit removal of fuel, small timber and manure leaves from the forests. Such illicit felling, indiscriminate hacking and lopping resulted in depletion of the valuable growing stock in the forests adjoining the villages. The position of forest offences in this invision is furnished in appendix V. This statement does not give the exact picture of damage caused by theft since many cases go undetected.

139. *Grazing.*—Considerable damage to the mangrove regeneration is caused by the semi wild cattle in Muthupet reserved forests. Actually these cattle are left to roam without any grazier for indefinite period by the people from adjoining villages. The menace by the semi wild horses in Kodiakadu reserved forests is equally great to the natural regeneration. There is unrestricted grazing in all the forests resulting in the absence of natural regeneration of valuable species and hardening of the soil leading to erosion. The present degraded condition of the forests is chiefly attributed to the evil effects of over grazing and goat browsing in the forests. In fact there is very little grass in the forests due to continuous over grazing by large number of cattle. A statement showing the grazing revenue and grazing incidence is furnished in appendix VI.

Repeated and unrestricted browsing by goats and other cattle in young regeneration areas has resulted in branchy and stunted growth of cashew at Komapuram, Neppugai and Avanam, etc.

SECTION 3—FAUNA.

140. The occurrence of forest areas in discontinuous blocks and the pressure of human population upon the forest resources inhibit the development of wild life in general and the larger mammalian forms in particular. The elephant, tiger, panther and bison are totally unknown in this division.

141. Ponies of small size but possessing much endurance are bred in small number near Point Calimere and are allowed to run wild in the jungle.

142. In G.O. Ms. No. 1821, Agriculture, dated 13th June 1967 the Government have notified an area of 4,271.82 acres of Kodiakadu reserved forests and its extensions as Point Calimere Wild Life Sanctuary. The Government have also in their order No. 2871, Agriculture, dated 5th October 1967 approved the proposal of the Chief Conservator of Forests for the acquisition of six patta lands measuring 22.54 acres or 10.00 hectares of lands situated in 133 Kodiakadu village which have been acquired as per award No. 6/69, dated 18th December 1969 of the Land Acquisition Officer and Revenue Divisional Officer, Mannargudy.

143. Point Calimere Wild Life Sanctuary is unique in having a large concentration of black buck or Indian antelope which is fast disappearing in many other parts of the country. Other mammals commonly found are Cheetal, Jackal, Wildpigs, Bonnet monkey which constitute the only game of the larger sort. Jackal and foxes exist everywhere, mangoose are not uncommon, jungle cats are plentiful and civet cats are occasionally met with in thickets and woody places. The ordinary grey monkeys which once abounded in many places is not found now but the bonnet monkeys with the black face, and a darker body with a fringe of hair round the face, a short hairy natural cap on the head and a long tail is found mostly in the wooded parts.

144. Common rats, mouse rats, or blind mice and bandicoots are common everywhere. Common grey striped squirrels are found in gardens, grove and forests.

Mammalia:

145. *Black buck or Indian antelope.*—(*Antelope cerricarpa*) Black buck, the sole representative of antelopes is found in Kodiakadu reserved forests of this division. Its striking colour and beautiful spiralled horns which may reach the shoulder height of the animal give it an elegance hardly equalled by any antelope. When young its coat is a yellowish fawn which when three years old starts to turn black. There is a large concentration of this animal in Kodiakadu.

146. Black buck usually prefers open sandy stretches and large herds are often seen at the very edge of the sea. Only during hot part of the day they move to the cover of the jungle. The animals are always wary and alert, seldom allowing visitors to get into a close range.

147. *Chital or spotted deed* (*Axix axix*).—The chital is perhaps the most beatiful of all deer. Its coat is a bright rufous fawn profusely spotted with white. They feed till late in the morning and again in the afternoon and lie down in the interval in some shaded spots. The population of spotted deer in Kodiakadu appears to have declined considerably over the years and they are seldom seen nowadays. The only explanation for such an alarming decrease is poaching since vension is a much relished meat by the local people.

148. *Wild boar* (*Sus scrofa*).—It is commonly found in Kodiakadu feeding on roots, tubers, etc. They feed early in the morning and late in the evening. They roam in herds and are very destructive to root crops and tender rhizomes. A boar seldom makes an attack without provocation but will charge at anything when enraged. It is perhaps the most courageous of all wild animals and generally fights to the end.

149. *Wild dog* (*Cusn alpinus*) *and Jackals* (*Canis aureus.*)—The wild dog is not very common and it is distinguished from the jackal by its long lanky wolf like body with bushy tail and very distinctive in its red coat. Usually wild dogs hunt by day. It is the most formidable depredator of game of every size and description and the destruction of wild dogs in rewarded at Rs. 10 per dog.

150. Jackal is smaller in build and meaner in aspect than its wild relative, the wolf. They usually come out at dusk and retire at dawn and usually go about alone or two or more may hunt together. They feed on carcasses, offal and scarlet crab on the seashore. They are plentiful in the island near Kodiakadu reserved forests.

151. *Fruit bat* (*Cynopterus sphinx*).—These bats are found suspended in large numbers on the branches of fruit trees (Ficus) during the fruiting season and they aid in pollination, seed dispersal and act as agents of propagation. The meat is priced for its taste by local shikaris.

152. *Bonnet mecacue* (*Macaca radiata*).—This is a little pale faced monkey commonly seen in villages and jungles. Troops of as many as twenty or thirty animals may be found feeding on the ground or in the trees. It is more arboreal in habit than most macaques, hence its longer tail. Bonnet macaques eat anything edible fruits, berries, leaves and shoots also insects, grubs and spiders.

153. *Black maped hare or Indian hare* (*Lepus nigricollis*).—This common hare found in plains and in the forests is distinctive in having a dark brown or black patch on the back of its neck from the ears to the shoulder, upper surface of tail black. Generally it is seen solitary but not in frequently in pairs. It feeds on grass and it is nocturnal in habit but not exclusively so. It scoops out a hollow and settles down to sleep.

154. *Common mangoose* (*Herpestes edwardri*).—This is a taurny yellowish grey mongoose with no stripe on the side of its neck. Commonly found in the forests of Kodiakadu. The alternate light and dark rings on its hairs gives its coat a grizzled 'pepper and salt' tinge. Powerfully built it preys on mouse-deer, hares, bandicoots, field rats, birds and reptiles. They hunt singly by day or night. It takes shelter under rocks or bushes sometimes digging a hole for itself in the ground.

155. *Small India mongoose* (*Herpestes auropunctatus*).—Its smaller size, shorter tail, its olive brown, gold flecked, soft silky fur are distinctive. The Small Indian mongoose lives in holes burrowed by itself. It is diurnal in habit and is seen hunting its food about bushes, bedges and in cultivated fields. The presence can be detected by the worn tracks it leaves along the bedges. It feeds on anything it can kill, rats, mice, snakes, scropions, centipodes, wasps and insects of all kinds. Like its larger relative, it is useful in ridding a house of vermin.

156. *Reptilia.*—Among snakes of special interest occurring in the forests of this division mention may be made of Russel's riper (*Vipera russelli*), the peeled riper (*Echis carinata*), the common Indian coral snake (*Nembibungarus nigrescens*), the chain Viper (*Vipera*), the carpet snake (*Morelia variegata*), all of which are more or less poisonous. The cobra (*Naia tripudians*) and the common kriat (*Bungarus caerulens*) are fairly common both within the forests and in the enclosure of cultivation.

157. The Rock or India Pythons (*Python molurus*) are absent in this division. Monitar lizards and rat snakes are fairly common in this division. Other snakes that are commonly met with are:—

158. *Crocodiles* (*Crocodiles palustris*).—Once Crocodiles were abundant in this division but have now become relic of the past due to indiscriminate shooting as its skin is highly valued abroad. Few Crocodiles are said to occur near Grand Anicut. Now it is declared as a protected animal and there is a ban on the export of their skins. The occurrence of the Indian Monitar (Veranus minotor) is common in the damper parts. Different kinds of lizards such as Tree lizard (*Calptus versicolor*), Cround lizard (*Maluya carinata*) and the Green lizard or Chamaeleon (*Chamaeleon zeylanicus*) occur throughout in the open cultivation and in gardens and groves.

159. *Acouatic animals.*—The common otter (*Lutra lutra*) is found along the water courses and streams of Talanayar reserved forests. It makes its lair in hollows beneath the roots of trees growing by water edge. The usually hunt in pairs in the evening driving a shoal of fish to the shallows.

160. The estuaries of Muthupet and Talainayar abounds with a great variety of fishes . Besides the usual varieties of sea-fish, the flying fish, the kola are caught on the coast. The mair and the seer fish are caught in the lagoons. The Catala, the Indian Carp, the Gourami, the Etroplus, the Bengal Carps, the Rohu and the Mirgal are found in abundance in the Cauvery reservoir and in the rivers. Hilsa occurs in the Coleroon. Tortoise occurs is the ponds and lakes where the water is still and stagnated.

161. *Avifauna.*—The swamps of Point Calimere are of great interest to ornithologists since it abounds a considerable variety of interesting avifauna. Flamingoes visit these swamps in thousands during winter months and the vast congregation of these birds with white and pink plumes offer an unforgettable and spectacular display. Large numbers of migratory birds can also be observed in the backwaters of Muthupet and Talainayar during the winter months.

162. The avifauna of this division is rich and varied and offers immense pleasure and enjoyment to a zealous ornithologist. The game birds, grey jungle fowl (*Gallus sonnerattii*) and red spur fowl (*Gallopardix spacia*) are met with in great abundance. Partridge (*Francolinus pondicerianus*) occurs in the open thorn forests and attracts any passerby its ringing high pitched musical call. The grey quail (*Coturnix coturnix*) is most common and a walk through jungles often disturb them from their ground nests. Flocks of green pigeon (*Treron phoenicoptera*) are commonly seen on the plateau and they favour stream banks and fruiting fig (*Ficus gibbosa*) trees. The blue rock pigeons (Columbia liyia) are found in open patches.

163. The peafowl (*Pavo cristatus*) now elevated from the status of a game bird to a national bird is introduced in Kodiakadu. The plaintive call of peacock, a harsh scream is unmistakable and often heard.

164. The birds that are commonly found near human habitations in gardens, groves and in open cultivation are:—

1. White cheeked bulbul	*Melpaspes leucogenys*
2. White browed bulbul	*Pycnonotuus leteolus*
3. House crow	*Carvus splendens*
4. Jungle crow	*Carvus macrorhynches*
5. Indian cuckoo	*Geculus micropterus*
6. Hawk cuckoo (Brain fever bird).	*Ceculus varius*
7. Indian courser	*Cursorius coromandelicus*
8. Hoopee	*Upupa epops*
9. Pond heron	*Arteela gravii*
10. Iora	*Aegithina tiphia*
11. Brahminy kite	*Haliasture indus*
12. Pariah kite	*Milvus migrans*
13. White breasted king fisher	*Halcyon smyrnesis*
14. Red wattled Lapwing	*Vanellus indicus*

15. Yellow wattled Lapwing	*Vanellus malabaricus*
16. Common myna	*Acridotheres tristis*
17. Brahminy myna (Black headed).	*Sturnus pagodarum*
18. Grey headed myna	*Sturnia malabarica*
19. Spotted owlet	*Athene brama*
20. Born owl	*Tyto alba*
21. Rose ringed parakeet	*Psittacula krameri*
22. Blue rock pigeon	*Columba livia gmelin*
23. Magpie robin	*Copsychus saularis*
24. House sparrow	*Passer domesticus*
25. Yellowthroated sparrow	*Jymnorhis xanthocollis*
26. Wire tailed swallow	*Hirundo smithii*
27. Purple sunbird	*Cinnyris asiaticus*
28. Purple rumped sunbird	*Cinnyris zeylonicus*
29. Palm swift	*Cypsiurus parvus*
30. House swift	*Apus affinis*
31. King vulture	*Torgos calvus*
32. White backed vulture	*Cyps bengalensis*
33. White scavanger vulture	*Meophron percnopterus*
34. Golden backed woodpecker	*Bracnypternus benghalensis*
35. White eye	*Zozterops palperbrosa*

165 In the open forests of Kodiakadu and in the scrub forests of the plains the characteristic birds are :—

1. Common baler	*Turdoides caudatus*
2. Jungle babler	*Turdoides striatus*
3. Redvented bulbul	*Pycnonotus cafer*
4. White browed bulbul	*Pycnonotus luteolus*
5. Pied bushchat	*Saxicola caprata*
6. Common green bee eater	*Merops orientalis*
7. Large green bee eater	*Meropsorientalis ceylonicus*
8. Chestnut headed bee eater	*Merops leschenaulti*
9. Crow pheasant	*Centropus sinensis*
10. Stone curlew	*Burhinus oedicnemus*
11. Pied crusted cuckoo	*Clamator jacobinus*
12. Red winged crested cuckoo	*Clamator coromandus*
13. Plaintive cuckoo	*Carcomantis merulinus*
14. Jerdon's chloropsis	*Chloropsis jerdeni*
15. Black dronge	*Dicrurus adsimilis*
16. White bellied drongo	*Dicrurus caerulescens*
17. Ashy drongo	*Decuros leucophara*
18. Spotted dove	*Streptopelia chinensis*
19. Ringed dove	*Streptopelia decaoets*
20. Little brown dove	*Streptopelio Sapegalensis*

21. Red turtle dove	*Streptopelia tranouebarica*
22. Crested serpent eagle	*Spilornis cheela*
23. Palla's fishing eagle	*Haliaeetus leucoryphus*
24. White breasted see eagle	*Haliaeetus leucogaster*
25. Short toed eagle	*Circaetus gallicus*
26. Tickl's flower pecker	*Dicaeum erythrorhynchos*
27. Grey jungle fowl	*Gallus sonneratii*
28. Paradise flycatcher	*Terpsiphone paradisi*
29. Fan tail flycatcher	*Rhipidura albogularis*
30. Verditer flycatcher	*Muscicaea thalassina*
31. Rofous tailed flycatcher	*Muscicapa ruficanda*
32. Blue throted flucatcher	*Muscicapa rubeculoides rubeculiodes*
33. Red breasted flycatcher	*Muscicapa paya*
34. Pale harrier	*Circus macrourus*
35. Grey hornbill	*Tockus birostris*
36. Koel	*Eudynamis scolopaceus*
37. Kestrel	*Falco tinnunculus*
38. Blackwingedkite	*Elenus caeruleus*
39. Sky lark	*Aluda gulgula*
40. Bush lark	*Mirsfra assraica*
41. Black bellied finch lark	*Eremopterix grisea*
42. Crested lark	*Galerida cristata*
43. Small minivet	*Pericrocotus cinnamomeus*
44. Orange minivet	*Pericrocotus flammeus*
45. Scarlet minivet	*Pericrotus flammeus*
46. Green billed malkoha	*Rhopodytes viridirostris*
47. Red headed merli	*Falce chicquera*
48. White throated munia	*Uroloncha malabarica*
49. White backed munia	*Uroloncha striata*
50. Spotted munia	*Uroloncha punctulata*
51. Jungle myna	*Acridopheres fuscus*
52. Common Indian night jar	*Caprimulgus asiaticus*
53. Chestnut bellied muthatch	*Sitta castanea*
54. Great horned owl	*Bubo bubo*
55. Golden oriole	*Oriolus oriolus*
56. Grey patridge	*Francolinu pondicerianus*
57. Green pigeon	*Treron phoenicoptera*
58. Indian pitta	*Pitta brachyruna*
59. Indian pipit	*Anthus rufulus*
60. Blossom headed parakeet	*Psittacula cyanocephala*
61. Blue winged parakeet	*Psittacula columboides*
62. Tree pie	*Dendrocitta vaiabunda*
63. Rain quail	*Cothurnix coromandelica*
64. Button quail	*Turnix tanki*
65. Indian robin	*Saxicoloidus fulicata*

66. Indian roller (Blue jay).	*Coracias benghalensis*
67. Shikra	*Accipiter badius*
68. Wood shrike	*Tephrodornis pondicerianus affinis*
69. Bay bucked shrike	*Lanius vittatus*
70. Rufous backed shrike	*Lanius schach*
71. Ashy swallow shrike	*Artamus fuscus*
72. Black headed shrike	*Coracina melanoptera*
73. Grey shrike	*Lanius excubitor*
74. Tailor bird	*Orthotomus sutorius*
75. Grey tit	*Parus major*
76. Whistling thrush	*Myophonous caeruleus*
77. Orange headed ground thrush	*Geokichala citrina*
78. Pied ground thrush	*Geokichla wardii*
79. White wagtail	*Motacilla alba*
80. Large pied wagtail	*Motacilla maderaspatensis*
81. Grew wagtail	*Motacilla cinerea*
82. Yellow wagtail	*Motacilla flaba*
83. Ashy wren warbler	*Prinia socialis*
84. Dull green leaf warbler	*Phylloscopus procholeideaviridanus*
85. Thick billed warbler	*Phragmapicels sedon*
86. Blith's reed warbler	*Acrocophulus dumetetrus*
87. Paddy field warbler	*Acrocophulus ugricols*
88. Common weaver bird (Baya).	*Ploceus phillippinus*
89. White throat lesser	*Sylvia curruca*

166. Migratory birds that are found in the lagoons of Muthupet, Talainayar and the great swamp of Point Calimere are :—

1. Avocet	*Recurvirostra avosetta*
2. Chestnut bittern	*Ixobrychus cinnamomeus*
3. Curlew	*Numenius arquata*
4. Stone curlew	*Burhinus oeticnemus*
5. Little cormorant	*Phalacrocorax niger*
6. Large cormorant	*Phalacrocorax carbo*
7. Debchick	*Podiceps ruficollis*
8. Dunlin	*Erolia alpina*
9. Darter (Snake bird)	*Anhinga melanogaster*
10. Little egret	*Egretta garzetta*
11. Large egret	*Egretta alba*
12. Cattle egret	*Bubulcus ibis*
13. Flamingo	*Phoeni copterus roseus*
14. Bar headed goose	*Ancer indicus*
15. Black headed gull	*Larus ridibundus*
16. Brown headed gull	*Larus brunnicephalus*
17. Lesser black headed gull	*Larus fuscus*

18.	Greater black headed gull	*Larus ichth yaetus*
19.	Gadwall	*Anas strepera*
20.	Black tailed godwit	*Limosa limosa*
21.	Bar tailed godwit	*Limosa lappnica*
22.	Pond heron	*Ardeola grayii*
23.	Grey heron	*Ardea cinerea*
24.	Night heron	*Nycticorax nycticorax*
25.	Indian reef heron	*Egretta gularis*
26.	White ibis	*Threskiornis melanocephalus*
27.	Knot	*Calidris canutus canutus*
28.	Common kingfisher	*Alcedo atthis*
29.	Pied king fisher	*Ceryle rudis*
30.	White breasted kingfisher	*Halcyon smyrensis*
31.	Indian three toed kingfisher	*Ceyx erithacus*
32.	Brown headed strok billed kingfisher.	*Pelargopsis capensis*
33.	Indian moorhen	*Gallinula chloropus*
34.	Purple moorhen	*Porphyrio porphyrio*
35.	Oyster catcher	*Haematopus ostralegus*
36.	Brown fish owl	*Bubo zeylonesis*
37.	Pintail	*Anas acuta*
38.	Red necked phalarope	*Phalaropus lobatus*
39.	Pratincole	*Glareola lactea*
40.	Grey pelican	*Pelacanus philippensis*
41.	Golden plover	*Pluvialis dominica*
42.	Eastern golden plover	*Pluvialis docinica*
43.	Kentish plover	*Charadrius alexandrinus*
44.	Grey plover	*Pluvialis squatarola*
45.	Large sand plover	*Charadrine taschenavli*
46.	Great stone plover	*Esacus recurvirostris*
47.	Little ringed plower	*Charadrius dubius*
48.	White eyed pochard	*Aythya nyroca*
49.	Ruddy sheldrake	*Tadorna ferruginea*
50.	Ruff and reeve	*Philomachus pugnax*
51.	Common sand piper	*Trginga hypolencos*
52.	Harsh sand piper	*Tringa stagnatilis*
53.	Curlew sand piper	*Calidris testaccus*
54.	Broad billed sand piper	*Limicola felsinellus*
55.	Terek sand piper	*Tringe terek*
56.	Spotted sand piper	*Tringa glareola*
57.	Green sand piper	*Tringa ochropus*
58.	Red shank	*Tringa totanus*
59.	Green shank	*Tringa nebularia*
60.	Little stint	*Calidris minutus*
61.	Temminek's stint	*Calidris temminckii*

62.	Shovellar	*Anas clypeats*
63.	Black winged stilt	*Himantopus himatopus*
64.	Spot bill	*Anas poecilorhyncha*
65.	Jack snipe	*Lymnocryptes minimus*
66.	Fan tail snipe	*Capella gallinago*
67.	Spoon bill	*Platalea leucorodia*
68.	Open billed stork	*Anastomus oscitans*
69.	Painted stork	*Ibis leucocephalus*
70.	River tern	*Sterna aurantia*
71.	Caspian tern	*Hydroprogne caspia*
72.	Red sea crested tern	*Talasseus bengalensis*
73.	Black bellied tern	*Sterna acuticauda*
74.	Little tern	*Sterna albifrons sinensis*
75.	Whiskered tern	*Chlidonias hybrida*
76.	Gull billed tern	*Gelochelidon nilotica*
77.	Gargany teal	*Anas querquedula*
78.	Whistling teal	*Dendrocygna javanica*
79.	Common teal	*Anas crecca*
80.	Cotton teal	*Nettapus coromandelianus*
81.	Turn stone	*Strepsilas*
82.	Whimbrel	*Numenius phaeopus*
83.	White breasted water hen	*Amaurornis phoenicurus*

CHAPTER III — UTILISATION OF THE PRODUCE.

SECTION 1—AGRICULTURAL CUSTOMS AND WANTS OF POPULATION.

167. *Agricultural customs.*—Agriculture is the predominant occupation of the people. Before the advent of Cauvery-Mettur project nine taluks out of eleven had the benefit of Cauvery irrigation. A major portion of Pattukottai taluk and a fair portion of Aranthangi taluk was brought under plough after the advent of Cauvery-Mettur project. Two main seasons of cultivation are named after the two varieties of paddy, viz., Kuruvai and Samba. Besides paddy, sugarcane and bannana are raised in wet lands which pay rich dividends. The establishment of sugar mills at Tiruvarur and Budalur has ensured a steady price for the sugarcane growers. Cocoanut plantations have been raised all along the margin of Cauvery river and its branches as well as along the sea coast in Pattukottai and Aranthangi taluks.

168. Cholam, kambu, ragi, samai, groundnut, cotton, castor, gingelli, thinai are the chief crops of dry tracts in Pattukottai and Aranthangi taluks. The tree crops are mainly casuarina raised by the agriculturists principally on the padugai lands of Cauvery and all along the sea coast. Plantations of casuarina and cashew are not uncommon in the interior parts. The farmers are well aware of the scientific methods of cultivation such as sowing of improved strains and varieties of seeds, reduction of seed rate in nurseries, economic planting of seedlings, the use of better kind of manure and implements and elimination of pests and diseases by crop protective measures. The use of tractor with its accessories for deep ploughing is quite common in this region. Tobacco cultivation is the main occupation in the villages adjoining the Kodiakadu reserved forests.

169. Cattle are kept in large numbers mainly for dung as they are otherwise not of much use. The cattle are generally small and weedy. The cows are poor milkers and the bullocks are poor working animals. Sheep and goats are also reared as a subsidiary occupation to supplement the agricultural income.

170. Poultry farming, bee keeping and the production of fish, milk and eggs are getting popular. There is a cattle breeding farm functioning at Orathanad to improve the quality of the cattle.

171. *Population.*—According to the 1961 census the population figures of the Thanjavur district are given under:

District.	*Area in sq. miles.*	*Population.*		*Density per sq. km.*		*Remarks.*
		1951.	1961.	1951.	1961.	
(1)	(2)	(3)		(4)		(5)
Thanjavur	2,982,670		3,245,927	480	520	9 per cent increase.

There is a significant increase in the population which reflects the general trend of the country.

172. *Wants of population.*—The main requirements of the local population in respect of forest produce are:—

1 Firewood for domestic consumption.
2 Small timbers for agricultural implements and building purposes.
3 Bamboos for construction and cottage industries like basket weaving, etc.
4 Grazing.
5 Green manure leaf.
6 Fodder and thatch material.

7 Thorn for fencing materials.
8 Minor forest produce.
9. Mines and minerals.

173. *Firewood.*—There is a keen demand for firewood in this division and the villagers living in the vicinity of the forests never pay for firewood and prefer to pilfer from the forests. The villagers living far away from the forests use stalks of dry crops and cow dung cakes. The fuel extracted from the mangrove forests and casuarina plantations raised by Forest department meet the requirement of Thanjavur district only to a very small extent. Apart from being used as domestic fuel a small quantity of firewood is utilised in brick and lime kilns. Most of the demand for fuel is met with the trees grown in patta lands and porombokes. The vast casuarina plantations and cashew plantations raised by private people in their lands meet the local demand to a great extent. The demand for firewood in the towns is getting reduced to some extent due to the introduction of " Leco " supplied by the Neyveli Lignite Corporation which is getting popular. Gas is also used as domestic fuel in the houses of more affluent classes but the supply is extremely limited.

174. Casuarina is most valued as fuel due to high calorific value. Needles, pruned branches, roots and stumps of casuarina are also favoured as fuel. Tamarind, velvelan, kodukapuli and vagai obtained mainly from the unreserves and patta lands are preferred for use in brick and lime kilns in addition to Phoenix and Palmyrah stumps due to their high calorific value. Among the species occurring in the natural forests those that are preferred as firewood are *Acacia planifrons, Acacia leucophloea, Acacia sundra, Acacia monophylla, Albizzia amara, Canthium dicocum, Inga dulce, etc.* Among the mangrove species *Excaecaria agallocha* is not preferred as fuel due to irritant smoke. Among the mangrove species only *Avicennia officinalis* and *A. alba* are used as fuel.

175. The ex-zamin forests at Ettiathalai, Kurumbur, Melpanaikadu, Senghengudy, Komapuram and Neppugai are in such a degraded condition that they can hardly meet any demand for fuel.

176. *Timber.*—Timber is not available in the forests of this division. The local requirements are met by imports from Coimbatore, Mettupalayam, Pollachi, Nagercoil, Tirunelveli and from Kerala markets. *Thespesia populnea, Calophyllum inophyllum,* are grown locally in the coastal villages provide ribs for boat buildings.

177. The normal requirements of the ryot are ploughs, plough shares, spokes, shafts, hubs, cart wheels and small posts, rafters and reepers for the house. The timber requirements are mostly met by *Acacia arabica* and other suitable species such as *Azadirachta indica, Mangifera indica, Artocarpus intearifolia, Thespesia populnea, Calophyllum inophyllum, Casuarina equisetfolia, Borassus flabellifer Morinda tinctoria* growing in villages and patta lands. In the rural areas palmyrah rafters and posts are used for house construction in addition to the casuarina and bamboo rafters and poles. The villagers living in the vicinity of the forests usually get their requirements from the nearby forests mostly by illicit removals. The species commonly exploited are *Acacia arabica, A. leucohploea, A. sundra, A. planifrons, Albizzia lebbeck, A. emara, Azadiracha indica* and *Chloroxylon sweitenia.* Though casuarina is much fancied as fuel it is also used for constructional purposes such as posts, ridge pieces, wall plate rafters, masts for county boats and as punting poles for rail boats and for scafolding.

178. *Bamboos.*—This is a poor man's timber and widely used by villagers as poles and roofing material for constructional purposes. There is keen demand for bamboos for making thatties, mats and baskets and as props in plantain topes, betel gardens as well as fencing material. The bulk of the requirement is obtained from the bamboos grown in patta lands and porombokes, etc. Forests of this division hardly meet the demand though bamboo is grown to a small extent along the banks of streams, canals, etc., which is almost negligible.

CHAPTER—IV ; STAFF AND LABOUR SUPPLY

Section 1 Staff

234. The establishment of the Thanjavur forest division consists of a District Forest Officer and his staff at Thanjavur and the staff attached to different ranges.

235. The establishment of the division as it stood as on 1st March 1970 is given in the following statement :—

(a) *Office establishment* :

District Forest Officer.

Serial number and name of post. (1)	*Permanent.* (2)	*Temporary.* (3)	*Remarks.* (4)
1 District Forest Officer	1	..	Assistant Conservator of Forests.
2 Head Clerk	..	1	
3 Accountant	..	1	
4 Draughtsman	1	..	
5 Typist	1	..	
6 Assistants	..	2	
7 Junior Assistants	..	4	
8 Peons	..	3	
9 Office Watchman	..	1	
10 Jeep Driver	1	..	
11 Tractor Driver	..	1	
12 Tractor Clearner	..	1	
Total	4	14	

(*b*) Range Offices.

Serial number and ranges.	*Junior Assistant.*		*Peon.*		*Watchman.*		*Remarks.*
	Permanent.	*Temporary.*	*Permanent.*	*Temporary.*	*Permanent.*	*Temporary.*	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1 Puttukottai	1	..	1	..	..	1	..
2 Plantation Range I	..	1	..	1	..	..	Thanjavur
3 Plantation Range II	..	1	..	1	..	..	Kumbakonam
4 Plantation Range III	..	1	..	1	..	..	Tiruchirappalli.
5 Plantation Range IV.	..	1	..	1	..	..	Sirkali.
6 Plantation Range V	..	1	..	1	..	..	Mannargudi.
7 Farm Forestry	..	..	..	1	..	..	Aranthangi.
Total	1	5	1	6	..	1	

(c) EXECUTIVE AND PROTECTIVE STAFF

Serial number and name of the range.	Range officers.		Foresters.		Forest guards.		Reserved watchers.		Total.	Remarks.
	Permanent.	Temporary.	Permanent.	Temporary.	Permanent.	Temporary.	Permanent.	Temporary.		
(1)	(2)	(3)	(4	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1 Pattukottai	1	..	3	..	10	..	..	10	24	
2 Plantation Range I.	1	..	3	2	1	4	..	1	12	Thanjavur.
3 Plantation Range II.	..	1	2	..	..	6	..	..	9	Kumbakonam.
4 Plantation Range III.	1	..	1	1	..	4	..	..	7	Tiruchirappalli.
5 Palantation Range IV.	1	..	3	..	2	2	..	4	12	Sirkali.
6 Plantation Range V.	..	1	1	1	..	2	..	..	5	Mannargudi.
7 Farm Forestry	..	1	..	5	..	..	..	..	6	Aranthangi.
Total ..	4	3	13	9	13	18	..	15	75	

236. Besides the above mentioned territorial establishment there is a Wild Life unit with headquarters at Vedaranyam which is under the control of the State Wild life Officer and the staff of that unit is furnished below :—

Serial number and particulars of staff.	Number.	Headquarters.	Remarks.
1 Range Officers	1	Vedaranyam.	
2 Forester	1	Kodaikkadu	In charge of Point Claimers game sanctuary in Kodai kadu reserved forest and water fowl refugee of the Great Swamp.
3 Forest Guard	1	Do.	
4 Watcher	1	Do.	
5 Bungalow Watcher	1	Do.	5 In charge of rest house.
6 Forster	1	Talainayar	In charge of water fowl refugee at Talainayar reserved forest.
7 Watcher	1	Do. ..	
8 Watcher	1	Muthupet.	In charge of water fowl refugees at Muthupet reserved forest.

237. The above staff are engaged for the protection and improvement of wild Life in Point Calimere Game Sanctuary, water fowl refugee in the Great Swamp at Point Calimere, Muthupet, Talainayar, etc.

238. Details of sanction accorded for posts of special schemes are given below :—

Serial number and name of the post.	Name of the scheme.	G.O. No. and date.	Remarks.
(1)	(2)	(3)	(4)
1 Assistant Conservator of forests	119. Capital outlay on Forests d. Development Schemes—Scheme in the Fourth Five year plan works-7. schemes for plantations along river and canal lake fringe forests.	G.O. Ms. No. 1168, Agricultural, dated 3rd April 1968.	For thinning and other maintenance operations in Teak plantations. One peon was also sanctioned. The staff was disbanded after a period of one year.

SECTION 2—LABOUR SUPPLY.

239. Generally labour problem is not acute. The availability of labour is governed by the schedule of agriculture operation. As the important forest operations like ploughing, pitting and planting coincide with the agricultural operations, with the advent of rain, some difficulty is experienced for procuring labour during agricultural seasons due to the attractive wages and food grains offered by the agriculturists.

240. The wages paid at present in the division as per Forest Schedule of Rates are given below :—

Forest Wages.	
Men	Rs. 2·00
Women	Rs. 1·50

SECTION 3—MISCELLANEOUS.

241. *Adivasis at Kodiakadu.*—There are about 40 families of Adivasis at Kodiakadu. Enquiry reveals that they actually belong to the caste called Ambalakara pillai. They eat the fruits of Naval, Fig, Kalakkai, Palai, Elendai, Kasan, Palmyrah, Echan and Chinthilkody (*Tinospora cortifelia*) commonly found in Kodiakadu reserved forests and other adjoining village forests. Their staple food consists of "Poonai Kachi Kottai" which is taken from the pod and the seeds are washed several times in water and boiled. The boiled seeds are again washed and pounded which is relished as food by Adivasis.

242. *Narikoravars.*—The Narikoravars, commonly met within the district, are wandering tribe who eke out their precarious livelihood by snaring animals and birds and selling the same.

CHAPTER V: PAST SYSTEMS OF MANAGEMENT.

SECTION 1—GENERAL HISTORY OF THE FORESTS.

243. *Political history of the region.*—The Tanjore country was for more than a thousand years the home of the Cholas. From the dawn of history down to the end of the 13th Century the Cholas made it the seat of their dominions, the heart of all their activities alike in war and peace.

244. The earliest references to the Chola Kings are to be found in the Asokan inscriptions of 260 B.C. The Mahavamsa of Ceylon records the conquest of Ceylon in the middle of the second century B.C. by a Chola named Elara who is said to have ruled it for nearly a half century. The Chola Kingdom was known to the Greek geographers and is mentioned in the periphus Maris Erythraei (about 70 A.D.) and by Ptolemy (140 who states that the capital was then at Uraiyur which is now a part of Tiruchirappalli town. But for the early history of the Cholas no source is more precise than the Tamil Sangam literature.

245. Karikala, the most prominent of the Cholas, renounced sea capital Puhar (Kaveripattinam) and patronised liberally arts and letters. He raided Ceylon, pushed his arms as far as Himalayas, aided for himself the alliances of the kings of Vafra, Magadha and Rvanthu and constructed the Grand Anicut of the Cauvery which formed the foundation of the development of modern irrigation system which is hailed as a great engineering feat even today.

246. From the third century A.D. up to the middle of the nineth century the Kalabhras, Pallavas and Pandyas overran the Thanjavur and Chola rulers. Chola rulers have been consigned to a position of complete subjection. Then came the swift downfall of the Pandyas as well as the Pallavas. The Cholas were once again a mighty race of rulers. Vijayalaya (850–870) the founder of the new chola dynasty assisted by his son Aditya I crushed the Pandyas. Aditya I (871–907) subjugated the Western Gangas and conquered the kongu country and he built temples all along the banks of the Cauvery from Sahyadri to the sea.

247. Paranthaga I (907–955) was a very powerful ruler and under his leadership the Cholas acquired a dominion which foreshadowed the greater empires of Rajaraja and Kulattunga. With the rise of Rajaraja I (985–1014) the son of Paranthaga II dawned a new and brilliant chapter in the history of the Cholas. He was a great conqueror, great statesman and efficient administrator. Lord Pragatheswarar temple at Thanjavur built by Rajaraja I stands as a monument in architecture even today. Rajaraja was succeeded by his son Rajendra (1014–1044) who increased the glory of the Chola empire by conquering many victories over Chalukya, Ceylon, Chera and Pandya countries.

248. The Chola throne passed on to a new line, the East Chalukyan line, through Kulottunga (1070–1120) who was more a statesman than a warrior. The Pandyas and Hoysales in the 13th century monopolished all the power of the Chola empire. During the middle of 13th century the entire Tamil country passed into the hands of the ruler of Vijayanagar. During the reigns of Viranarasimha and Krishnadevaraya South India remained completed loyal to the Vijayanagar Empire. Nayak dynasty was formed by Senappa Nayaka during the middle of 16th century. In the Nayak dynasty Raghunatha Nayaka was the most celebrated ruler who built various temples, defeated his rebels.

249. The sun was fast setting during the middle of 17th century on the Vijayanagar Empire. Ekoji (1676–1683) founded the Maharashtra dynasty of Tanjore. Saraboji is the celebrated king of the Maharashtra dynasty who patronaged, various arts, sculpture, music, etc.

250. In 1799 Tanjore was ceded to the British government. With the rise of British power came the end of the last of the Indian dynasties of Tanjore. From 1799 Thanjavur was under the control of the British till the proclamation of independence in 1947.

251. *Early forest history.*—The following account of forest conservancy is extracted from the District Gazette:—

252. "Prior to 1914, the reserved forests of Thanjavur district extended even to Thanjavur and Shiyali taluk but in 1914, the forests in Thanjavur and Shiyali were disreserved and sold and only Kodiakadu (3,995 acres) and Talainayar (3,055 acres) forests of Tiruthuraipoondi taluk were maintained as reserved forests. The other reserves are small in extent and consisted of isolated patches of casuarina and mixed forests. Subsequently Muthupet block was reserved in 1937".

253. *Administrative history.*—The operations of the Forest department were extended to this district in 1971. Until 1971, Thanjavur and Tiruchirappalli were two forests divisions, incharge of one and the same District Forest Officer, but with two district establishments. The two were amalgamated in 1911 under the designation "Tiruchy-*cum*-Thanjavur". This division had seven ranges. In 1915 a change in policy resulted in the small reserves and the rest being transferred to the South Arcot district. About the same time, the Padugai forests of the district were ordered to be handed over to the Public Works Department and one range was abolished. Some reserves were disafforested and a number of forests were placed under Panchayat management. Numerous changes on similar lines (in the jurisdiction of areas and the ranges) took place from time to time. The later day changes resulting in the present position are indicated below:—

254. In 1941, the Padugai forests of the Cauvery and Coleroon basins were transferred to the District Forest Officer, Salem South from the management of the Public Works Department and the Padugai range was formed with effect from 1st February 1944.

255. The reserved forests of Thanjavur district which were transferred to the control of the District Forest Officer, South Arcot district in 1915, remained under his control till 1918. From 1918 onwards they came under the control of the local Revenue Officer. From 1946, a regular Ranger was posted in charge of Tiruthuraipoondi Range, but the Revenue Divisional Officer, continued to be ex-officio District Forest Officer, till the formation of Tiruchirappalli forest division on 1st March 1950.

256. The Tiruchirappalli forest division was revised on 1st March 1950 taking over Thuraiyur and Padugai ranges from Salem South division, Ayyalur range from Madurai division and the Mannargudi range of Thanjavur district from the Revenue Divisional Officer, Mannargudi.

257. In pursuance of G.O. No. 1416, Revenue, dated 2nd June 1951 issued under the Madras State (Abolition and Conversion into Ryotwari) Act 1948, the forests of the following Zamindaries and inams were transferred to the control of the Forest Department on the dates noted against them:—

Zamins.	*Revenue district.*	*Date of transfer.*	*Range included in*	*Remarks.*
1 Palaivanam	Thanjavur	15th October 1951.	Mannargudi.	..
2 Nagaram	Do.	Do.	Do.	..
3 Gandarvakottai	Do.	Do.	Do.	..
		Inams.		
4 Ravundanvayal	Thanjavur	25th April 1953	Mannargudi	..
5' Chatram forests	Do.	12th March 1953	Do.	..
5 Chatram forests	Do.	14th March 1953	Do.	..
6 Villanivayal	Do.	15th June 1954.	Do.	..

258. Thanjavur forest division as it exists now was formed on 1st September 1956 with reference to G.O. Ms. No. 1584, Agriculture, dated 20th June 1956 with the main object of forming teak plantations along the rivers and canals of the Cauvery system. Prior to that, the forest areas in Thanjavur revenue district, consisting of the mangrove forests, revenue lands, two ex-zamin forests and Kodiakadu reserved forest were managed under a single range at Mannargudi attached to the Tiruchirappalli forest division, which was formed on the 1st March 1950. The Mannargudi range continued to be under the control of the District Forest Officer, Tiruchirappalli till January 1957 and it was transferred to Thanjavur division from 1st February 1957, when the reorganisation of divisions and circles was effected.

259. Thanjavur forest division when formed in September 1956 was attached to the Development Circle, Madras when the circle was abolished with effect from 1st February 1957 on account of the reorganisation of the department, the division was attached to Madurai circle up to 31st March 1959 and with the further readjustment of divisions among the circles in the State, ordered in G.O. No. 1461, Food & Agriculture, dated 30th March 1956, Thanjavur division was added to Coimbatore circle with effect from 1st April 1959 and continues to remain in the same circle.

SECTION 2—PAST SYSTEMS OF MANAGEMENT AND THEIR RESULTS.

260. *General.*—At present the division consists of different categories of forests namely reserved forests, reserved lands, ex-zamin forests and areas under the control of the forest department but not yet notified under section 16 of Madras Forest Act of 1882 for reservation. These forests were covered by different working plans at different periods and the division produces mangrove fuel, casuarina fuel, a variety of minor forest produce, mainly fish and cashew and provides facilities for grazing of the cattle.

Early systems of exploitation.

261. The Kodiakadu forest was under the control of the Revenue department prior to reservation. Removal of forest produce was allowed for *bonafide* domestic and agricultural requirements on purchase of permits for Re. 1 each. From 1892 to 1907–08 the forest department issued permits at one anna per head load and Rs. 1-4-0 per cart load for the collection of dry fuel from Kodiakadu reserved forest. In Talainayar forests, forest produce was removed freely prior to reservation. But after reservation (from 1888) the same rates levied in Kodiakadu forests were followed for the removal of forest produce.

262. Prior to 1911 Chatram department, a branch of the District Board was managing the Muthupet block and removal of dead wood was allowed on permit system. The area came under the control of the Revenue department from 1911–12 and systematic coupe fellings were introduced. The control of the Muthupet block was again handed over to the Chatram department from 1st July 1923 by a written agreement according to which the Chatram department was to control the expenses and get half of the net revenue as supervision charges. Chatram department claimed large sum as supervision charges, disproportionate to the revenue obtained and they did not agree to the proposals made by the Collector to reduce the disproportionate supervision charges claimed by them. Hence from 1st July 1932 (G.O. Ms. No. 864, Development, dated 26th June 1932) the Muthupet forest was taken over by the Revenue department from the management of Chatram deprartment. At last Muthupet forest was reserved from 1st May 1937.

Exploitation under Forest department.

263. In Kodiakadu reserve for the first time regular fuel coupes were laid out in 1907–08 to be worked under coppice with standard system. The same system was followed in Talainayar reserve and fuel coupes were laid out in 1908–09. In Kodiakadu reserve coupe fellings were discontinued from 1908–09 till 1913–14 due to the agitation by the local landlords on the pretex that their valuable tobacco cultivation lying to the north and west of the reserve would be reduced to sandy wastes if fellings were continued in the adjoining reserved forest. "By 1913–14 the local opposition cooled down, no doubt, allayed by the results of the experimental coppice fellings which so far as Memecylon edule was concerned was an unqualified success and coupe fellings were resumed."

264. Prior to 1935 Kodiakadu reserve comprised 3,955 acres. In 1935, 25.65 acres were disreserved for the extension of the railway line from Agasthiyampalli to Point Calimere and in 1938, 626.82 acres lying on its eastern and northern boundary were reserved and added to it.

265 *Position as regards Working Plans.*—The first Working Plan for the Thanjavur reserved forests was prepared by Chengappa in 1918. Chengappa's plan was revised by said-ud-din and the revised prescriptions were brought into force in 1935–36. Said-ud-din Ahmed's plan expired in 1944–45 but the forest continued to be treated under the same prescriptions till 1948 when the revision of the plan was taken up by Bhoja Shetty. Bhoja Shetty's plan came into effect from 1949–50. K. P. D. Rao compiled the unified plan for the forests of the Thanjavur forest division as per Chief Conservator of Forests C.C.P. Mis. 92/61, dated 31st May 1961 by taking out relevant extracts from the Tiruchirappalli Working Plan by K. Thirumalairaj and incorporating the draft scheme prepared by M. Thyagarajan for planting teak along the river and canal banks. This is the current plan in force from April 1955 to March 1970 which has been approved in C.C.P. Mis. 272/62, dated 5th December 1962. The present plan is for the entire Thanjavur forest division, as constituted from 1st September 1956 and thus revises the unified working plan by K. P. D. Rao.

Chengappa's Working Plan (1918–1934).

266. In 1918 the first Working Plan was prepared by Chengappa for the Thanjavur reserved forests. He prepared two separate plans, one for Kodiakadu and other for Talainayar reserved forest. Coppice with standard was the silvicultural system prescribed by him for both the reserves but with different rotation for each of them. He prescribed a rotation of 30 years for Kodiakadu and 12 years for Talainayar forest. He drew up a scheme for Muthupet block on identical lines to that of Talainayar to be followed by Chatram department.

Mangrove Working Circle :

267. In 1935-36 Said-ud-din included the mangrove forests of Talainayar and Muthupet under the mangrove clearfelling working circle and he prescribed to clearfell the area leaving standards (20 per acre) of *Avicennia officinalis* as seed bearers and the rotation was fixed at 20 years. He formed two separate series for working in Talainayar and Muthupet reserved forests. The coppice with standard system with 12 years rotation prescribed by Chengappa was discontinued. Said-ud-din prescribed artificial regeneration of *Avicennia Officinalis* by direct sowing. But this was abandoned after a few trials due to unsatisfactory results achieved. Further he prescribed the digging up of channels to induce artificial inundation in areas where the ground level was rising due to fresh accretions and where Avicennia was showing signs of dying off due to ineffective inundation. This prescription was discontinued after a few attempts due to the prohibitive cost it involved and its failure to induce any natural regeneration.

268. Bhoja Shetty's plan which came into force from 1949-50 continued the same prescriptions of the previous plan with regard to silvicultural system, rotation and method of executing fellings. In Talainayar series coupes I and II were worked in 1950 and 1951, after which no coupes were worked. In Muthupet series coupes I and III were worked from 1950 to 1952 and in 1954 coupes IV and V were worked in the same year. The cyclone of November 1952 caused a great deal of damage in the mangrove forests.

269. Bhoja Shetty suggested experiments to regenerate the extensive blanks in mangrove forests with suitable species like *Acacia arabica* and *Thespesia populnea* but nothing was done in that direction.

Simple coppice working circle :

270. Said-ud-din proposed one series in Kodiakadu reserved forest. He prescribed silvicultural system of simple coppice with reservation of healthy trees yielding minor forest produce such as tamarind, soapnut, konnai with a rotation of 30 years.

271. In 1938 there was agitation from the local agriculturists against fellings in the reserve on the pretex that their lands would be reduced to sandy wastes if fellings were allowed in the adjoining reserved forests. Further there was keen demand for dry leaves in the reserved forests as manure for tobacco cultivation. The problem of regeneration of *Manilkara hexanera* remained unsolved. Hence for all these reasons the Government in G.O. Ms. No. 2383, Development, dated 24th September 1936 ordered that fellings of fuel coupes in Kodiakadu reserved forest should be stopped and the sale of dry leaves was allowed.

272. Bhoja Shetty included the Kodiakadu reserved forest under the dry evergreen working circle and he prescribed no fellings in Kodiakadu forests as they are set apart for the supply of manure leaves for the local tobacco cultivation. In addition they serve as a protective belt to prevent drifting of sand from the coast to the cultivated field.

273. He divided the Kodiakadu forests including the adjoining village forests into three blocks and prescribed a rotation of 3 years for the removal of dry leaves under the cover of permits issued departmentally at a cost of one anna per chit. Removals were permitted only on head loads. Lopping was prohibited. Dry leaves were removed in one block once in 3 years and the block was allowed to rest for the remaining two years. The right of removal of dry leaves was sold in public auction in 1952-1953 as a experimental measure which fetched at revenue of Rs. 2,589. This method was continued since then.

Protection working circle.

274. Said-ud-din included the areas with inferior type or growth and areas adjoining Agasthiampally salt factory and cultivation lands in Kodiakadu reserved forests under this working circle. Large blanks of Muthupet reserved forest also formed part of this working circle. Fellings from these areas were to prohibited except fellings for departmental work or for free grants. The northern and western portions of Kodiakadu reserved forest though containing good growth was excluded from coppice working circle and included in

the protection working circle as a wind belt to protect the Vedaranyam Salt Factory and adjoining cultivated lands from sand drift. But actually from 1939 onwards the whole of Kodiakadu reserved forest was included under protection working circle as per G.O. Ms. No. 2383, Development, dated 24th September 1938.

Grazing working circle :

275. Felled coupes in Muthupet, Talainayar, and Kodiakadu reserved forests were closed to grazing for 5 years including the year of felling. Other areas were open to grazing. The grazing fee varied from reserve to reserve.

Grazing Rate.

	Kodiakadu.	*Talainayar.*	*Muthupet.*	*Remarks.*
	Rs. A. P.	Rs. A. P.	Rs. A. P.	
Buffaloe	0 4 0	1 0 0	0 8 0	..
Cow	0 4 0	0 8 0	0 4 0	..
Sheep	0 2 0	No demand.	No demand.	..
Ponies	0 4 0	Do.	Do.	..

276. The presence of "semi wild" cattle posed a great problem in Kodiakadu reserved forests. The villagers buy grazing permits only for a few cattle and the rest of the cattle were grazing without permits and thus there was difficulty in realising the full grazing value of the permits. Semi wild cattle are owned by the local villagers and allowed to graze inside the forests without permit and whenever they want them they capture the cattle which are distinguished by blended marks.

Bhoja Shetty's Plan :

277. Grazing was regulated by the issue of permits under usual conditions as in the previous plan.

Minor forest produce working circle :

278. *Said-ud-din's plan.*—Each reserve was treated as a separate unit and all items except species of Suaeda were sold together. Suaeda was sold separately since there was a keen demand for this species as a mordant. Avaram and manure leaves were prohibited from sale. But avaram was leased out as a separate item since 1945-46. The Government in their G.O. Ms. No. 2383, Development, dated 24th September 1938, has permitted the removal of dry leaves from Kodiakadu reserved forests at the rate of two annas per headload which was subsequently reduced to one anna.

279. Free fishing in the lagoon of Muthupet reserved forest was not recognised at the time of reservation. But subsequently on representation the same privilege was conceded in the lagoon in Muthupet reserved forest under section 18 of the Madras Forest Act of 1882 as per Chief Conservator's proceedings Miscellaneous No. 136, dated 28th April 1943.

280. Till 1943, the right of fishing "in pits and puddles" of the Muthupet reserved forest was sold in public auction annually, but from July 1944, the same was given to one A. M. Mohammed Sheik Davood for three years on agreed payment to the department.

281. The Government in G.O. Ms. No. 372, Development, dated 9th March 1935 directed that the rentals from the fisheries in the sections of the Cauvery system passing through the Muthupet and Talainayar reserved forests be credited to the Fisheries department.

282. The Tahsildar, Tiruthuraipoondi sold the right for fishing in Talainayar reserved forest in public auction annually along with rights for fishing in creeks and streams in the unreserves and the revenue realised was credited to the Fisheries department.

283. The Range Officer, Tiruthuraipoondi sold the right of fishing in Kodiakadu reserved forests and the revenue realised was credited to the Fisheries department.

284. *Bhoja Shetty's plan.*—Each reserved forest formed one unit for the exploitation of general minor forest produce. No changes were made in the prescriptions for the method of fishing. In Talainayar the right of fishing is sold in auction annually by the Revenue department along with the rights for fishing in creeks and streams in the unreserves. In Muthupet, the right of fishing in pits and puddles is sold by negotiation to the Parvatha Rajakula Fishermen Co-operative Society since 1951–52 as per Chief Conservator's (CCP. Mis. No. 307 of 1951, dated 7th July 1951) fishing in the lagoon is free. In both the cases the revenue is credited to the Fisheries department.

285. But in Kodiakadu reserved forest the right of fishing is sold along with other minor forest produce and the revenue is credited to the Forest department.

286. The right of collection of konnai bark from the reserved forests of Mannargudi range (now Pattukottai range) is sold in auction once in three years, the entire range forming one unit (vide Chief Conservator's Mis. No. 482/50, dated 30th November 1950).

287. The right of collection of avaram bark from Kodiakadu reserved forest is sold separately as one unit.

288. *Zamin and Inam forests.*—All forests falling under this category were hacked and exploited recklessly from the movement the Madras Estate (Abolition and Conversion into Ryotwari) Act 1948, was framed by the Government. Everywhere encroachments were common. Chatram (mangrove forests) is the only forest in the area that escaped the damage. Many of the Zamin and Inam forests are small in extent and very much scattered. At no time they were managed scientifically. A brief account of the treatment meted out to these forests prior to the date of taking over is furnished below :—

289. The Chatram forests of Thanjavur district were managed by the Chatram department, a branch of the District Board and the revenue realised was spent to maintain the numerous chatrams and rest houses built by the late Raja of Thanjavur, for the convenience of pilgrims going to Rameswaram.

290. Though the area is extensive the effective wooded area is less. This mangrove forest was worked in the same manner as the adjoining Muthupet reserved forest which was also managed by the Chatram department up to 1911-12 and 1923 to 1932. Removel of deadwood was allowed on permit system in the distant past. However regular exploitation by annual coupe system on a 20 years rotation was introduced by about 1920 and one rotation has been completed. During the cyclone of November 1952, this area was also very badly affected resulting in large scale damage to the stand.

291. The right to fish in the streams, pits and puddles was leased out annually, sometimes on 5 year lease and this formed a major source of revenue, which was Rs. 5,750 at the time of taking over.

292. Grazing was allowed under cover of permits at four annas per cow and eight annas per buffaloe.

293. *K. P. D. Rao's Working Plan.* (*Current Plan in force from 1955 to 1970*).—K. P. D. Rao in his unified plan has constituted the following working circles :—

(1) Mangrove working circle
(2) Casuarina plantation working circle
(3) Cashew plantation working circle
(4) Minor Forest Produce working circle
(5) Manure Leaf working circle
(6) Plantation working circle
(7) Miscellaneous prescriptions

179. *Grazing.*—Grazing is by far the heaviest demand on the forest since there has been an alarming increase in the number of cattle that resort to the forests. Cattle in Thanjavur district migrate to South Arcot district in search of pasture when the wet lands are under cultivation. Cattle belonging to village adjoining Muthupet, Talainayar and Kodiakadu are allowed to graze in these forests under permit. "Semi wild" cattle that are present in Kodiakadu and Muthupet reserved forests cause considerable damage to the natural forests. The semi-wild cattle are actually village cattle that are allowed to roam in the forests at their will without any grazier accompanying them. There is heavy damage to the cashew regeneration at Komapuram, Avanam and Neppugai due to grazing. On an average about 6,000 cow units graze in the forests of this division every year. The incidence of grazing is 3.5 ha. for very cow unit.

180. The incidence of grazing in Thanjavur forest division from 1956 to 1969 is given in appendix VI. Grazing from Ramanathapuram, i.e. "Konars" come to Aranthangi and Pattukottai taluks in search of babul and odai fodder for their cattle, mainly sheep and goat, during agriculture season and pen their cattle in the field.

181. *Green manure leaf.*—There is a keen demand for green manure leaves for wet and tobacco cultivation. The forests of Thanjavur division hardly meet this demand. Chemical fertilizers and farm yard manure are commonly used by the agriculturists. Green manure plants are also widely cultivated in the patta fields. Species such as *Gliricidia maculata, Sesbania indica, Thespesia populnea, Dodonea viscoasa, Calotropis gigantea, Poinciana elata, Azadirachta indica, Ficus bengalensis, Inga dulce, Memyceylon edule, Samanea saman, Aysgium cunini, Lannia Grandis, Inoigophora pulchella,* are popularly used as green manure.

Cassia tora, Coccidentalis, C. Siamea, etc., are rarely used. The removal of green manure from the forests is only on a limited scale.

182. *Fodder and thatch material.*—The villagers living close to forests require fodder grass for stall feeding. This was permitted free of cost for bonafide domestic use if the same is removed in headloads.

183. Palmyrah leaf is the most popular and highly economical roofing material for cheap houses. The villager packs it in such a way that each leaf overlaps other beneath it over closely woven bamboo reepers. This serves as an ideal non-conducting material, insulating the interior from extremes of heat and cold and reasonably safe from rain for a few years. This is also a material which is abundant in its supply and removed in head loads. Its removal is regulated under cover of permits issued by the lessees of minor forest produce who buy the right to remove this produce with other items of minor forest produce.

184. The use of palmyrah leaves as thatching material for huts is common in Pattukottai and Aranthangi taluks and other coastal regions near Vedaranyam. Large number of palmyrah trees found in Chatram forests and on patta lands meet the demand for the thatching material to a great extent.

185. *Thorn and fencing materials.*—The demand for thorns and fencing material is keen and widespread in certain parts of the division. This demand is met to a small extent from bamboos grown in private holdings. Palmyrah stalks and leaves are popular as fencing materials near Manamelkudy and adjoining villages.

186. *Minor forest produce.*—Fishing is the main occupation for many villagers who live in and around Talainayar and Muthupet. In Muthupet reserved forest fishing is free in the lagoons. Fishing in pits, puddles, small streams and portion of the Korayar passing through Government forests is leased out to the Fishermen's Co-operative Societies by negotiation.

294. *Mongrove working circle.*—Mangrove forests of Talainayar, Muthupet reserved forests, Chatram (Thuraikadu) forest and the forest at the mouth of Coleroon near Pudupattinam have been included in this circle. Blanks devoid of any tree growth and areas with scanty growth were excluded from the working circle. A permanent preservation plot of 9.6 acres in Muthupet reserved forests was also excluded. The working circle was divided into five felling series namely Talainayar, Mothupet, Chatram, Coleroon and Tamaramkottai series, etc.

295. The silvicultural system prescribed was clearfelling and retaining all advance growth below 6 feet in height in Talainayar, Coleroon and Tamaramkottai series where the practice of retaining 20 seed bearers per acre was discontinued. The coupes were worked on 20 years rotation. It was also prescribed that in Muthupet and Chatram series 20 trees should be retained as seed bearers per acre which are not to be felled. Felling of Alayathi seedling less than 3 inches in girth at base or below 6 feet in height was not allowed. Throwing of brushwood in the creek passing through the coupes or boundary was prohibited to enable the free floating of Avicennia seeds to help natural regeneration. The whole working circle was closed to grazing permanently.

296. During the cyclone of 30th November 1952 accompanied by a tidal wave the whole of Muthupet reserved forest and Chatram forests were over-run by the sea and remained submerged to a depth of 6 feet or so for a fortnight with the result the great majority of the trees died completely. The young growth below about 3 years have revived after the recession of salt water. Mangrove coupes in Talainayar series were worked from 1955 to 1960 (except in 1956) and the series was closed from 1961 onwards. Coupe II was not sold in 1956 and was worked as arrear coupe in 1957 along with coupe III. There were 6 coupes in that series. Muthupet and Chatram series were closed from 1959 and 1960 onwards.

297. *Coleroon series.*—Coupe No. I to VIII in Coleroon series were worked from 1957 to 1963. For coupe No. IX and X in Coleroon series there was no demand in 1964 and 1965 and hence they were not worked. Exploitation in coupe No. XIII and XIV resumed in 1970 only which were due for felling in 1968 and 1969 respectively. Coupes IV to VI Tamaramkottai series remained unsold from 1964 to 1967 and the same coupes were worked as arrear coupes during 1970. So also coupe VII and VIII which were due for working in 1967 and 1968 were worked as arrear coupes during 1969 only. The lack of demand for mangrove coupes in previous years was due to the fact that the contractors were not allowed to use the boats through water ways to transport their cut materials fearing that they will smuggle contraband goods. But from 1969 onwards they were permitted to use the lagoons, etc., to transport their material with the result the mangrove coupes were sold easily. The details of coupes worked in each series and the amount realised, etc., are furnished in appendix IX.

298. There has been a sustained demand for mangrove fuel in these parts. Coppice regeneration is generally satisfactory. The prescribed rotation appears to be quite adequate. Though the mangrove areas are closed to grazing permanently the presence of the "semi wild" cattle is still a menace to the regeneration, since they avidly eat away the Alayathy seedlings thus preventing the establishment of the same.

299. K. P. D. Rao's plan prescribed the selling of dead wood in Kodiakadu reserved forests on a three years cycle which was deleted as per Chief Conservator of Forests, Rt. 1200/65, dated 8th June 1965 due to lack of demand for the same.

300. None of the mangrove series had complete set of coupes to go round the working plan period of 15 years. Muthupet and Chatram series had three coupes each already worked by 1958. Talainayar had six coupes, all of them have already been worked. Coleroon was having 14 coupes.

301. Tamaramkottai series was formed in Tamaramkottai, Maravakkadu Chatram forests during 1959–60 as per Chief Conservator's No. Rt. 1489/60, dated 12th September 1960, to supply fuel to Muthupet and Tamaramkottai village. Bits I and II of coupe I were sold for working in 1960–61.

Coupe I, Bit I	...	28.8 ha. = Rs. 4,600.
Coupe II, Bit II	...	30.4 ha. = Rs. 2,551.

There was considerable damage from the cattle to the young crop in felled coupes.

302. With the opening of several brick kilns round about Muthupet and Pattukkottai, Tillai wood for which there was no demand previously is also consumed in the kilns. Hence the fuel coupes are getting a reasonable price. The margin of 1½ chains along the creeks in Muthupet and Chatram series have not been left along all the breeks as prescribed in the Working Plan.

Casuarina plantation working circle.

303. Casuarina plantations were commenced from 1946 at Alakkudy as wind belt. The coastal sandy tracts were planted initially. Later on it was extended to padugais and inland tracts.

304. The silvicultural system adopted was clearfelling with concentrated artificial regeneration of *Casuarina equisetifolia* transplants and a rotation of 7 years was prescribed. Casuarina was raised as pure crop. The technique adopted was clearfelling the existing growth, about 2 feet in height with full root system in pits of 1 foot by 1 foot by 1 foot size at an espacement of 8½ ' × 8½ ' during July. Planting of 2 seedlings, 6 inches apart, in each pit was prescribed, the less promising of the two to be cut at the end of the monsoon. Wells had to be dug at the rate of one for every two acres. It is also prescribed replacement of casualties during the first year, as and when they occur, one soil working during September and second soil working and mulching during December-January, fencing by Prosopis raised by repeated sowing, two years in advance of planting, closure of plantations against grazing during for three years including the year for formation, etc.

305. The watering regime suggested by K. P. D. Rao in his plan is as follows :—

(a) Half a pot of water per plant per day for the first 30 days.

(b) One-third pot of water per plant once in two days till 31st December except on rainy days.

(c) Watering the backward plants at the rate of 1/3 pot of Water per plant on alternate days till the end of March.

STATEMENT SHOWING CASUARINA AREAS SOLD AND THE AMOUNT REALISED WITH RATE PER HECTARES

(From 1956–57 *to* 1962–6—3.)

Year of felling.	*Name of locality.*	*Year of formation.*	*Area in hectare.*	*Total amount. realised.*	*Rate per hectare*
(1)	(2)	(3)	(4)	(5)	(6)
				RS.	
1956–57	Udayamarthandapuram	1947	10·31	2,500	245·10
1957–58	Sodiakudy	1949	10.31	12,000	1,176·47
1957–58	Do.	1951	4·65	5,650	1,228·75
1958–59	Do.	1950	13·24	21,220	1,687·35
1959–60	Mudalaimadugu	1952	9·71	20,600	2,145·82
1959–60	Sodiakudy	1952	10·92	15,802	1,453·15

(1)	(2)	(3)	(4)	(5)	(6)
1959–60	Alakkkudy	1955	2·42	4,000	1,666·65
1960–61	Mudalaimadugu	1953	4·04	14,321	3,580·00
1960–61	Sodiakudy	1953	4·85	15,500	3,229·17
1961–62	Maharajapuram Casuarina Plantation Bit I.	1955	13·20	33,030	2,502·27
	Do. Bit II.	1955	4·16	11,000	2,644·23
1961–62	Alakkudy Casuarinu Plantation	1955	13·48	4,015	297·84
1962–63	Alakkudy Casuarina Plantation	1955	7·68	14,200	1,848·95
	Udayamarthandapuram	1957	10·11	6,075	600·80
	1952 Road Casuarina trees in 1957 and 1958 Regeneration areas.			800	

306. In 1960 and 1961 miscellaneous growth at Maharajapuram, Alakkudy and Sodiakudy was felled for raising Casuarina plantations and the revenue realised is furnished below :—

Name of area	*Area in hectares.*	*Sale amount realised in* 1960	1960–61
(1)	(2)	(3)	(4)
		RS.	RS.
Maharajapuram Miscellaneous growth ..	18·12	5,001	..
Do.	22·25	..	2,850
Do. in Alakudy	2·02	..	550
Do. in Sodiakkudy	2·02	..	150

307. In addition to the above, the following plantations raised under plan schemes have been clearfelled after maturity :—

Serial number and Year of felling. (1)		*Name of the locality.* (2)	*Year of formation.* (3)	*Area in hectare.* (4)	*Total amount realised.* (5)
1	1964–65	Udayamarthandapuram	1958	4·5	6,000
2	1967–68	Maharajapuram	1960	21·44	17,550
3	1967–68	Pudupattinam	1960	4·45	3,555
4	1967–68	Alakkudy	1960	6·07	6,505
5	1968–69	Udayamarthandapuram	1961	15·58	11,525
6	1968–69	Kambiaranatham	1961	1·25	3,000
7	1968–69	Kovilady	1962	4·47	1,970
8	1968–69	Maharajapuram	1962	18·55	12,80
9	1968–69	Pudupattinam	1962	9.20	13,785
	1969–70	Kambiarnatham	1963	0·76	345
11	1969–70	Pudupattinam	1963	8·36	11,015
12	1969–70	Alakudy	1963	8·90	26,125

308. Three series namely Lower Anicut, Coleroon and other areas in **Mannargudi** range were formed.

309. The following statement shows the areas sold and felled as per the Working Plan prescriptions :—

Serial number and Year of felling (1)		*Name of the locality.* (2)	*Year of formation.* (3)	*Area in hectare.* (4)	*Total amount realised.* (5)
1	1964–65	Sodiakudy	1957	14·16	16,000
2	1965–66	Do.	1958	18·49	8,350
3	1966–67	Mudalaimadugu	1959	12·95	19,425
4	1967–68	Sodiakudy	1960	8·09	8,080
5	1968–69	Mudalaimadugu	1961	16·39	26.71

STATEMENT SHOWING THE COST OF RAISING CASUARINA PLANTATIONS (From 1956 to 1963-64.

Year.	*Locality.*	*Area in hectare.*		*Average cost per hectare.*
1956	Alakkudy	8·09		275·00
1957	Sodiakudy Udayamarthandapuram.	24·28		438·50
1958	Sodiakudy Udayamarthandapuram.	16·99		358·10
1959	Sodiakudy Mudalaimadugu	26·30		334·62
1960	Sodiakudy Alakkudy Maharajapuram.	29·74 (upto 1960)		154·47
1961–62	Mudalaimadugu	16·38	31·95	5,100·00
	Udayamarthandapuram	15.57		3,830·00
1962–63	Koiladi	4·04	29·63	1,995·00
	Pudupattinam	8·09		3,082·00
	Maharajapuram	17·50		8,830.00
1963–64	Kambiarnatham	0·80	29·10	151·94
	Koiladi	1·61		562·25
	Pudupattinam ..	8·90		2,486·75
	Coastal area Alakkudy	7·68		2,778.26
	Udayamarthandapuram.	10·11		2,947·71

310. The following statement furnishes the area planted with Casuarina in this division along with the cost of raising, etc.:—

Year. (1)	*Locality.* (2)	*Area in hectare.* (3)	*Total cost.* (4)
1964	Mudaliamadugu .. .. Sodiakudy .. .. Maharajapura	6·3 5·9 7·8	8,136.17
1964	Maharajapuram	8·0	3,043.00
1965	Udayamartandapuh	4·0	1,760.60
1965	Sodiakudy .. .. Pudhupattinam	22.2	12,165.76

Year.	Locality.	Area in hectare.	Total Amount.
1965	Sodiakudy	14·8	4,578·42
1966	Sodiakudy	16·4	5,365·85
1966	Mudalaimadugu	12·8	3,879·95
166	Pudupattina	19·8	3,732·10
967	Maharajapuram	21·2	7,045·52
1967	Alakudy	6·0	2,614·50
1967	Sodiakudy	8·0	3,189·25
1967	Pudupattinam	4·4	1,591.00
1968	Udayamarthandapuram	38·5	6,628·75
1968	Mudaliamadugu	16·8	7,409·25
1968	Pudupattinam	23·2	8,832·00
1969	Maharajapuram	18·4	7,366·30
1969	Pudupattinam	9·6	3,719·72
1969	Mahadhanapuram	40·0	17,076·35
1969	Koiladi	5·6	1,599·35

311. So far up to 1970, 360.27 ha. has been planted with casuarina in this division.

312. The scattered nature of the areas suitable for casuarina planting coupled with the irregular planting programme followed in the past poses some difficulty in the formation of series and allotment of equal areas for annual planting.

313. The casuarina plantations raised in Kodiakadu reserved forest over 40 acres during 1954 has failed and hence raising casuarina at Kodiakadu reserved forest was discontinued. The spacing and rotation prescribed by K. P. D. Rao appear to be quite adequate. The growth in the second and subsequent rotation crops appears to be poorer which may be due to loss of fertility of the soil. This is a problem which needs further investigation.

314. The prescription of raising Prosopis by sowing the seeds along the edge of the proposed casuarina site two years in advance of planting to form a live fence and planting of bamboo rhizomes at 22 feet apart along the river frontage was not followed.

Cashew plantation working circle.

315. K. P. D. Rao's plan suggested raising of cashew in Kodiakadu reserved forest over an area of 448 acres including the failed casuarina plantation sites. Accordingly he formed one regeneration series namely Kodiakadu series with 448 acres to be covered in 15 years (from 1955 to 1969) as detailed below :—

Year.	Locality.	Area in hectare.	Remarks.
1955	Kodiakadu series	12·4	
1956	Do.	12·0	
1957	Do.	10.4	

Year.	*Locality.*	*Area in hectare*	*Remarks.*
1958	Kodiakadu series	11·2	Discontinued due to failure since 1958.
1959	Do.	12·0	
1960	Do.	12·0	
1961	Do.	12·0	
1962	Do.	12·0	
1963	Do.	12·0	
1964	Do.	12·0	
1965	Do.	12·0	
1966	D	12·0	
1967	Do.	12·0	
1968	Do.	12·4	
1969	Do.	12·8	
	Total ..	179·2 ha.	

316. Planting of cashew was started in this division for the first time in the year 1955 at Kodiakadu reserved forest over an area of 12 ha. The silvicultural system prescribed was clearfelling the standing growth and conversion into cashew tope by artificial regeneration. The technique prescribed was planting basket or pot plants, at 16½ feet by 16½ feet interval, in pits of 1 feet by 1 feet by 1½ feet in receipt of first rains.

317. Other prescriptions include one weeding and soil working during December-January, fencing the area and permanent closure of plantations against grazing but allowing grass cutting in the regeneration area.

318. The following areas were planted with cashew in Kodiakadu :—

Year.	*Area.*
1955	30 acres or 12.0 ha.
1956	15 acres or 6.0 ha.
1957	26 acres or 10.4 ha.

319. The attempts at raising cashew in Kodiakadu reserved forest as prescribed in the working having failed, further planting was discontinued. Cashew was raised under plan schemes in the following localities which are typically suitable for cashew :—

Year. (1)	*Locality.* (2)	*Area in ha.* (3)	*Amount spent.* (4)	*Remarks.* (5)
		RS.	RS.	
1964	Melpanaikadu	12·00	2,460	
1965	Keeramangalam	20·00	4,379	
1966	Do.	20·00	4,421	
1967	Do.	20·00	5,104	
1967	Komapuram	40·00	12.366·00	

Year.	Locality.	Area in hectar.	Amount spent	Remarks.
1967	Senthengudy	10 00	966	(Done under Kumri
1968	Do.	74·00	13,429	
1969	Komapuram	40·00	2,029	
1969	Avanam	37·00		(Under Kumricultivation).
1970	Komapuram	60·72		
1970	Neppugai	40·88		

320. Since 1958 cashew planting has been extended to the upland tracts in the ex-zamin forests where more suitable conditions prevail for the cultivation of this species. The total extent of cashew plantations raised so far in this tract is 710.00 ha. upto 1970 and the details of planting in various localities are furnished below :—

STATEMENT SHOWING THE AREA IN WHICH CASHEW WAS RAISED WITH THE COST.

(From 1956 to 1962).

Year.	Locfility.	Area in hectare.	Rate per hectare.	Remaeks.
(1)	(2)	(3)	(4)	(5)
1956	Kodiakadu	12·14	20·00	Complete failure.
1957	Do.	10·52	37·50	
1958	Komavaram	20·23	50·00	
1959	Do.	72·84	55·00	
1960	Do.	72·84	..	
1960	Ettathalai	32·37	..	
1961–62	Senthangudy	40·46	4,175 00	
		40·46	348·00	
1962–63	Keeramangalam Forest	40·46	5,160·00 420·00	(in 1963–64).

321. Some of the plantations in the past have been attempted after clearing strips and cashew has been suppressed by the miscellaneous growth left in the intervening belt, as seen in Neppugai, Komapuram, Kurumbur and Senthangudy.

322. Some areas (1967 Senthangudy, 1969 Komapuram and 1969 Avanam) were given for Kumri cultivation and when the Kumridars cleared and uprooted the miscellaneous growth and worked the soil, it was found that the cashew was putting on rapid and vigorous growth. Generally thereis lack of demand for Kumri in this division and as such clearing and uprooting the miscellaneous growth was done departmentally in other plantations where there was no kumri cultivation. The kumri lease is granted for one year under a permit and it is the renewed for one or two more years if the kumridars fulfills the conditions satisfactorily They are not allowed to raise deep rooted crops and plants which cast heavy shade

323. No climber cutting has been done regularly with the result some of the plantations contain trees completely choked by climbers as in Kurumbur and Senthangudy. There were no fire lines since forest fires are practically unknown. Though the plantations were all closed to grazing as prescribed illicit and unauthorised grazing is going on (Avanam, Komapuram, Neppugai, Melpanaikadu, etc) since the plantations are situated very near the villages where grazing facilities are lacking.

324. As against the Working Plan prescriptions of planting of basket or pot plants in pits of 1 feet by 1 feet by 1½ feet cashewnuts are dibbled in pits of 1 feet by 1 feet by 1 feet at the rate of 2 nuts per pit since the later method is economical and the stocking obtained is fairly satisfactory without much difficulty.

325. *Cashew usufructs.*—Generally the right to collect cashewnuts from the cashew plantations is being leased out annually to open auction to contractors. When there is no demand from the bidders or when the plantations did not fetch reasonable price, departmental collection is resorted to. The details of departmental collection are given below.

326. During 1967–68 a quantity of 902 Kgs. of cashewnuts was collected departmentally from 1958 and 1959 Komapuram cashew plantations and an amount of Rs. 1,470 was realised by the sale of the same.

327. The details of plantations which were offered for sale for the collection of cashew usufructs and revenue collected are furnished in the following statement.

STATEMENT OF CASHEW USUFRUCT LEASE UNITS SOLD AND REVENUE REALISED.

Serial number and name of the unit.	*Revenue realised by the sale during.*					
	1964–65.	1965–66.	1966–67.	1967–68.	1968–69.	1969–70.
	RS.	RS.	RS.	RS.	RS.	RS.
1 1956–57 Neppugai 50·72 ha.	..	60	95	135	505	755
2 1958 Komapuram 20·24 ha.	320	500	575	..	2,561	2,300
3 1958 Neppugai 20·24 ha.	750	655	820	1,005	1,601	2,100
4 1959 Komapuram 72·85 ha	285	500	1,675	..	5,506	2,500
5 1960 Ettiathalai 32·38 ha.	..	75	150	500	750	900
6 1961 Santhangudy 40·47 ha.	..	..	..	75	105	145
7 1961 Kurumbur 40·47 ha.	..	130	150	1,900	2,100	2,400
8 1962 M lpanaikadu 40·46 ha.	..	..	25	160	350	2,100
9 1964 *M*elanaickadu 12·00 ha.	..	..	..	241	300	1,250
10 1965 Keeramangalan 20·00 ha.	..	..	..	..	175	2,325
11 1966 Keeramangalam 20·00 ha.	..	..	..	..	..	2,030
12 1967 Komapuram 40·48 ha.	..	..	..	..	..	2,305

328. *Manure leaf working circle.*—In the Working Plan by K. P. D. Rao, this circle consists of 3,556 acres or 1,422.4 ha. with one felling series namely Kodiakadu with three coupes all in Kodiakadu reserved forest. The working circle prescribed the removal of dry manure leaf from Kodiakadu for tobacco cultivation by the villagers adjoining the reserved forest, on a cycle of three years, one coupe being kept open for manure leaf removal annually.

329. The right of removal of dry leaves was sold annually in open auction with a lease period of nine months commencing from April (G.O. Ms. No. 1090, Development, dated 13th March 1951) and removal was controlled by issue of permits by the contractor. Removal of dry leaves was allowed under permit system up to 1952–53.

330. Removal of manure leaf from Kodiakadu reserved forest has since been discontinued from 1964–65 due to lack of demand and also because removal of leaf litter is silviculturally not a desirable practice.

331. The revenue realised from the removal of dry manure leaf from 1955-56 to 1963-64 is as follows:—

Year. (1)	*Amount realised in Rupees.* (2) RS.	*Remarks.* (3)
1955-56	1,060	
1956-57	777	
1957-58	Sale dropped.	
1958-59	740	
1959-60	750	
1960-61	1,985	
1961-62	751	
1962-63	800	
1963 64	750	Sale dropped since 1964-65.
Total ..	7,613	

332. *Removal of dead wood.*—Dead wood was removed illicitly in head loads from Kodiakadu reserved forest mostly by the women folk from the neighbouring fishermen hamlets. Proposals were submitted to the Chief Conservator of Forests in March 1960 for selling the right to collect dead wood in head loads on a three year cycle. The coupes corresponded to those of the dry manure leaf working circle. The first coupe was sold for Rs. 320 during 1960-61.

333. The right to remove 275 dead trees in Kodiakadu reserved forest in block II was sold for Rs. 1,353 in 1961-62. In 1962-63 Block III (380 trees) was sold for Rs. 2,503. In addition 77 dead trees in block II left unremoved in the previous year were sold for Rs. 803.

334. K. P. D. Rao's plan prescribed the selling of dead wood in Kodiakadu reserved forests on a three year cycle which was deleted as per Chief Conservator of Forests R. 1,200/65, dated 8th June 1965 due to lack of demand for the same.

335. *Finor Forest Produce working circle.*—All items of minor forest produce occurring in the whole of Thanjavur revenue district and certain items in unreserves except fishing and cashew usufructs are leased out annually in open auction to the contractors. Economically important minor forest produce like Avaram bark, Elendai, Cowdung, Palmyrah and Coconut leaves were sold separately, the reserved forest being the lease unit.

336. The revenue realised by the sale of minor forest produce items (except cashew usufructs and fishing lease) in the division is furnished below:—

Year. (1)	*Amount realised.* (2) RS.
1957-58	3,155
1958-59	4,914
1959-60	1,428
1960-61	1,600
1961-62	1,203
1962-63	1,089

Year. (1)	Amount realised. (2) RS.
1963-64	935
1964-65	979
1965-66	1,290
1966-67	1,557
1967—68	1,446
1968-69	962
1969-70	1,331
Total	21,794

337. The revenue is decreasing as seen from the above statement.

338. The exploitation is mostly seasonal through the agency of contractors with the lease period of one year generally commencing from April.

339. Cane is found in small quantities in Gopalasamudram reserved land but in sufficient quantities for commercial exploitation.

340. The Maharajapuram minor forest produce unit in No. IV Range (Sirkali) is sold annually and the revenue realised is as follows:—

Year.	*Amount realised.* RS.	*Remarks.*
1966-67	450	
1967-68	451	
1968-69	455	
1969-70	461	
1970-71	462	

341. The block which is only 4 acres in extent has been providing this revenue entirely from the yield of Zizyphus fruits.

342. The right for the collection of Palmyrah usufructs from about 3,500 trees in Manamelkudy was offered for sale as a separate unit in 1969-70 for the first time for an amount of Rs. 250. The reason attributed for the poor price is the non-availability of tappers in the area and presence of several thousands of palmyrah trees in the vicinity under the control of the Revenue department which also leases out the right of collection of usufructs.

343. *Fishing leases.*—Fishing in Talanayar reserved forest and adjoining unreserves is leased out by the Revenue department annually.

344. The right of fishing in the pits and puddles of Chatram forests (Thottam area) and Muthupet reserved forest is given on negotiation to the Fishermen's Co-operative Society at a rental based on the average of the auction amounts of 1961 and 1962 as per G.O. Ms. No. 304, Food and Agriculture, dated 31st January 1961. As the societies did not agree to the lease amount fixed the units were sold in auction during the year 1963-64 and 1964-65. During 1965-66 the units were leased out to the societies at negotiated rates in consultation with the Assistant Director of Fisheries. From 1966-67 onwards the units are allotted to the societies based on G.O. Ms. No. 365, Food and Agriculture, dated 6th March 1965.

187. Cashew is the chief item of minor forest produce which is obtained from the plantations raised in ex-zamin forests of Pattukottai range and Plantation range I. The raw nuts are disposed of in auctions, which are processed at Gandarvakottai and at other local cashew factories.

188. Other important items of minor forest produce are avaram bark (*cassia auriculatu*) Konnai bark (*Cassia fistula*) which are used as tanning materials in the tanneries in Tiruchirappalli and Dindigul. Though the tannin content is very high in mangrove species the cost of extraction and transport is prohibitive. Pungam (*Pongamia pinnata*), *ettikottai* (*Strychnos nux-vomica*), *nellikkai* (*Emblica officinalis*) vila (*Feronia elephantum*) wood apple or vilvam (*Aegle mamelos*) elandai (*Zizyphus mauratiana*) kilakai (*Carrissa caranadus*), jack or pila (Atrocarpus heterophyllus) tamarind (*Tamarindus indica*), Neem (*Azadirachta indica*), Sundaikai (*Solanum pubescens*), Eluppai (*Maduka latifolia*) yield fruits of medicinal and edible value. Leaves and nuts of cocoanut and palmyrah, phoenix leaves, gallnut, honey and wax are collected as minor forest produce which have got keen demand.

189. *Mines and minerals*.—Sand stones occur near Vallam and Thanjavur which are fit for building construction. Kanker found near Alakkudy in Sirkali which is high in lime is used for the manufacture of lime. Yellow ochre is spread over small areas west of Vallam and deposits of Soda occur on the Tiruchirappalli border south of the Cauvery.

190. *Industries and their needs*.—Thanjavur district is predominantly an agricultural district in which about 70 per cent of the population are agriculturists. There are more than 1,000 rice mills big and small scattered all over the district which provide employment for a large number of people. Each taluk is having one or two modern rice mills and paddy driers installed by the Food Corporation of India. There are few major industries like the textile mills at Manamelkudy and Aranthangi, sugar mills at Tiruvarur and Budalur. Cottage industries though employing a small number are nevertheless noted for their artistic merit and excellence. There is a wood working unit of Tamil Nadu Small Scale Industries Corporation at Mannargudi.

191. Fishing is an important industry in the coastal villages of Thanjavur district, Muthupet, Talainayar, Kodiakadu, Vedaranyam, Adiramapattinam, Pudupattinam, Kaveripattinam, Manamelkudy, Tranquebar, Nagapattinam, etc. where Marakkayars monopolise this trade.

192. The principal cottage Industries are silk and cotton weaving in Thanjavur, Ayyampettai, Kumbakonam, Kuttalam and Koranad. The Thanjavur district even today stands foremost in South India in the varieties of the fabrics woven in silk, cotton and lace, in the designs of the pattern employed and in the artistic skill exhibited in workmanship. Koranad is noted for "Kottadi" saries, Ayyampettai for the manufacture of "Kuthuni", Kumbakonam and Mannargudi for metalware where the metals used are generally brass, bronze and tin and copper. Thanjavur is equally famous for its industries like pith work, ornamental fans, scented bathies, engraved and inlaid work and musical instruments. Nagore is famous for ornamental fans and fancy boxes made out of palmyrah leaves which are artistically painted and decorated with gold foils and threads, fancy boxes, dolls, toys and rocking dolls. Nagapattinam is reputed for the manufacture of excellent steel trunks, brief bags, cash boxes, despatch boxes, etc. Weaving of Kailis in Nannilam taluk is also well known.

193. Next to handloom industry comes the mat industry which employs a large number of people. Mats are chiefly made of korai besides screw pine, palm leaf and cocoanut leaf. The korai is cut when green and longitudinally split into fibres and then dried and preserved and just before using are soaked in water. They are afterwards dyed in synthetic colours of yellow, red and green and dried again before they are woven. Sirkali, Senthengudy, Anikaramchatram are the chief centres for the mat industry. The mats are in great demand not only in this district but also in other places outside the district.

345. The following are the amounts realised by the sale of fishing units which is credited to XXIX Agriculture—In-land Fisheries.

PARTICULARS OF REVENUE REALISED.

Year. (1)	*Thottam Fishery unit.* (2) RS.	*Muthupet pits and puddles.* (3) RS.	*Remarks.* (4)
1956–57	5,265	4,000	
1957–58	5,350	3,600	
1958–59	5,105·90	4,600	
1959–60	5,227·50	4,100	
1960–61	..	..	
1961–62	30,000	10,000	
1962–63	9,215	1,755	
1963–64	8,100	4,000	
1964–65	18,515	..	
1965–66	9,500	2,000	
1966–67	15,409	3,300	
1967–68	13,700	2,915	
1968–69	16,100	3,500	
1969–70	5,013	..	

346. Fishing is free in the legoons of Muthupet reserved forests:—

347. In Kodikadu reserved forests the right of fishing is sold by the District Forest Officer along with other minor forest produce.

348. The right to fish in the tanks and streams of Manamelkudy Chatram forests is sold by the District Forest Officer.

349. The current plan prescribed the selling of Konnai bark as a separate unit, if there is sufficient quantity, on a 5 year cycle.

350. Avaram bark is exploited annually. During the past few years there is a decline in the demand.

Plantation working circle:

351. *Plantation working circle.*—The scheme for raising teak and other timber species along the margins of rivers, canals and lakes in the State was sanctioned in G.O. Ms. No. 1584, Food and Agriculture, dated 20th June 1956 as a part of the enlarged development works of the Forest department and was included in the Second Five-Year Plan. To investigate and implement the scheme a Special Forest Division with headquarters at Thanjavur was formed from 1st September 1956. Five Range Officers and one District Forest Officer with necessary executive and ministerial staff were posted for the work. All the lands at the disposal of Government along the fringes of rivers and canals were investigated in detail.

352. The investigation done during 1956–57 revealed that an area of about 1,103 ha. of compact blocks and 752 kms. along the river and canal margins were suitable for raising teak. The areas are mostly along the banks of the Vennar, Vadavar, Vettar, Cauvery and the Coleroon in Thanjavur and Tiruchirappalli districts and Tambaraparani

in Tirunelveli district. Small perennial river Vellar of South Arcot district is also included. The areas in the Salem revenue district have been excluded as they are small in extent and very much scattered.

353. No suitable areas were found to exist along the Vaigai in Madurai district, the Palar and Pennar in the North Arcot and South Arcot districts.

354. The original scheme for planting teak and other timber species on river and canal banks was drawn up by M. Thyagarajan and this scheme is followed with suitable modifications whereved necessary.

355. The total area selected for planting is 4,800 ha. with an annual target of 320 ha.

356. The scheme was drawn up for a period of 15 years from 1956–57 to 1971–72.

357. Teak is the principal species prescribed for planting. For areas unsuitable for teak, other species like *Terminalia arjuna, Terminalia tementosa, Dalberaia sissoo,* etc., are prescribed.

358. The espacements prescribed are 12 feet by 12 feet for compact areas and 16½ feet for the avenues. Watering is prescribed at the rate of one gallon per plant daily for the first fortnight after planting when there is not enough moisture on the ground, and thereafter at the rate of one gallon of water per plant on alternate days, until the outbreak of south west monsoon the next year, except during rainy season.

359. Rotation of 60 years is fixed provisionally.

360. Planting under this scheme was commenced in the year 1956 when 93 ha. were planted. Since then planting has been continued annually and till 1970 a total area of 5,295 ha. has been planted. At present the annual target for planting is 500 ha.

361. Teak is the main species planted. Other species raised are Sissoo, Vaigai, Mathy, Naval and Pungam. The espacement adopted at present is 11 feet by 11 feet as against the 12 feet by 12 feet proposed in the original scheme by M. Thyagarajan.

362. Planting of stumps, not less than one year old, is generally done in June, July when water is let out from Mettur reservoir. The watering regime adopted till September 1960 was as follows:—

(*a*) Watering once daily at half a pot of water per plant for the First 15 days.

(*b*) Watering once in 3 days at half a pot of water for 70 days (excluding rainy days) from 1st July to 31st January.

(c) Watering once in three days at one pot of water per plant from 1st February to 31st March.

(*d*) Watering in the second year once in 3 days at one pot of water from April to September.

363. Watering regime was revised in September 1960 as follows and the same is being continued at present:—

(*a*) Watering on alternate days with one pot of water for the first 20 days from the date of planting up to the end of June.

(*b*) Watering one pot of water once in 3 days (excluding rainy days) from July till the outbreak of north-east monsoon.

(c) Watering once in 5 days at one pot per plant from January till the end of June (excluding rainy and wet days) by the plot mazdoor till the outbreak of south-west monsoon.

364. The results of planting are generally very successful and the scheme as a whole has created a rich timber potential for the State.

365. The avenue plantations are handed over to the Public Works Department for further maintenance at the end of three years. The compact plantations are retained with the Forest department. No further suitable areas were available for compact plantations.

366. All the avenue plantations up to 1965 except the following have been handed over to the Public Works Department.

II Range Arasalurputhur ... ... 9.6 Kms.

IV Range Ayyavaiyanar ... ... 11.2 Kms.

367. The avenue and compet plantations raised up to 1958-59 in Tambaraparani region have been randed over to the District Forest Officer, Tirunelveli South, on 16th July 1959 on th closure of that unit at Palayamcottai for further maintenance.

368. List of plantations transferred to Tirunelveli South Division for maintenance is given below:—

Serial number.	*Year of planting.*	*Name of the plot.*	*Area in hec.*
		Compact areas.	
1	1958	Near Srivaikuntam anicut	2·46
2	1957	Cashew plot near Srivaikuntam	0·40
3	,,	Dalbergia sissoo	4·10
4	,,	Near Cattle fair	4·04
5	,,	Kandeswaram temple	1·61
6	,,	Alwartop	2·42
7	,,	Alwarthirunagari	1·81
8	1957	Surplus channel area	2·42
9	,,	Thottiankudi	5·46
10	,,	Rajapathi	2·43
11	,,	Seithukkuvittan	2·49
12	,,	Authur	2·42
13	,,	Odayarpatti	2·22
14	,,	Sendamangalam	2·02
		Avenue areas.	
15	1957	Near Kadayanaodai	3·23
16	,,	Near South main channel	8·90
17	,,	Near North main channel	32·37
		Compact areas.	
18	1958	Karungulam	8·49
19	,,	Ponnankurichi	9·91
20	,,	Manjavilai	1.21
21	,,	Thirudavilai	3·23
22	,,	Chairmankoil	8·09
23	,,	Irundamandai	1·81
24	,,	Chokkapalankarai	5·66
		Avenue area.	
25	1958	Seithuvitan channel	6·47
		Total ..	125·67

369. The following compact plantations raised in No. III Range between Noyyal and Tiruchirappalli have been handed over to the District Forest Officer, Tiruchirappalli, for further maintenance and protection as these blocks are either contigous or close to the forest blocks of Padugai range:—

Serial number.	*Year of planting.*	*Name of locality.*	*Area in hectare.*
(1)	(2)	(3)	(4)
1	1956	Perugemani	4·04
2	,,	Perugemani experimental plot	0·44
3	1957	Srinivasanallur	10·11
4	,,	Pettavathalai	1·33
5	,,	Sirugumani	2·02
6	,,	Tiruparaithurai	12·94
7	,,	Andanallur	2·34
		Total ..	33·22

370. Seven blocks of compact plantations of 29.4 ha. from No. II Range of Thanjavur division were handed over to Padugai range on 1st June 1964. In these plantations teak was raised initially and blanks were beaten up with sissoo and other miscellaneous species. The details regarding these plantations are given below:—

Serial number and Year.		*Locaity.*	*Area in hectare.*	*Remarks.*
(1)		(2)	(3)	(4)
1	1958	Kondayampatti teak	4·0	
2	1958	Thiruvalarsolai teak re-stocked with miscellaneous species in 1962–63 ..	4·8	
3	1958	Panayapuram teak re-stocked with miscellaneous species during 1962–63	3·2	
4	1959	Thirumanamedu teak re-stocked with sissoo during 1963–64	8·0	
5	1960	Idyathumangalam teak with miscellaneous species during 1961–62 ..	1·6	
6	1960	Javandipuram teak re-stocked with sissoo in 1961–62	4·0	
7	1960	Thalakudi teak re-stocked with miscellaneous species during 1961–62 ..	3·8	
		Total ..	29·4	

371. The following compact teak plantations raised in No. III Range between Noyyal and Rolanalli have been handed over to the District Forest Officer, Coimbatore North Division for further maintenance and protection.

Serial number. (1)	Year. (2)	Locality. (3)	Area in hectare. (4)	Remarks. (5)
1	1958	Kolanalli replanted with sissoo in 1959	4·4	Damaged by flood.
2	1958	Vengampur re-stocked with sissoo	20·0	Stem development poor and top dried up.
3	1958	Kodumudi teak	8·0	
4	1958	Naickanur teak	5·2	
5	1958	Noyyal teak (blanks stocked with sissoo)	8·4	
		Total ..	46·0	

372. A list of plantations raised up to 1970 in different ranges is furnished in appendix XIII and XIV.

373. In G.O. Ms. No. 1168, Agriculture, dated 3rd April 1968 one Assistant Conservator of Forests was sanctioned for a period of one year for thinning and other maintenance operations of teak. Cultural operations such as pruning the side branches up to half the height of the tree, climber cutting and thinning wherever necessary was done during 1968–69 both in avenue and compact teak plantation by the Assistant Conservator of Forests.

MISCELLANEOUS PRESCRIPTIONS.

374. *Grazing.*—Grazing is regulated by issue of permits. The current plan prescribes the closure to grazing permanently in mangrove forests and cashew regeneration areas. Casuarina plantations are closed for grazing for a period of three years including the year of formation.

375. The grazing rates to be levied from 1st July 1971.

Sheep—Re. 0.50 per head.

Cow, bull, horse, etc.—Re. 1.00 per head.

Buffaloe—Rs. 2.00 per head.

376. There is prescription in the current plan for the removal of fodder grass on head loads from the reserved forests.

377. The revenue realised by sale of grazing permit is as follows :—

Year. (1)	Amount. (2) RS. P.
1956–57	55·02
1957–58	485·67
1958–59	1,300·03
1959–60	1,486·20
1960–61	1,360·00
1961–62	1,301·00
1962–63	1,282·00

Year. (1)	Amount. (2) RS. PS.
1963 64	1,365 75
1964–65	2,239 00
1965–66	2,847 00
1966–67	2,853 25
1967–68	3,034 25
1968–69	3,343 50
1969–70	2,789 50
Total ..	25,742 22

378. *Boundaries.—Line clearing.*—The current plan prescribes the clearance of boundaries of all the reserved forests to a width of 18 feet by the beat subordinate themselves. Discrepencies exist in a few of the reserved lands between the settlement maps and boundary lines. K. P. D. Rao has prescribed the preparation of maps and renotification of boundary description according to the revenue resurvey maps after necessary field verification which was not taken up so far.

379. *Demarcations.*—Almost all the reserved forests (except Thuraikadu) and reserve lands have been demarcated on the ground by erection of stone pillars. Except in Talainayar reserved forest in all the other blocks stone pillars have not been numbered in accordance with the settlement maps.

380. *Reservation Proceedings.*—Section 16 notification are yet to be issued for 18 blocks out of which final draft notifications have been submitted to the Chief Conservator of Forests in respect of 16 blocks. Seven blocks are yet to be notified under section 4 of the Tamil Nadu Forest Act of 1882.

381. *Notification of compact blocks.*—There are about 166 compact blocks in this division out of which notification under section 26 of Tamil Nadu Forest Act of 1882 have been issued only for 35 blocks and the remaining blocks are yet to be notified. There are 9 blocks which are not fit for notification since the areas are affected by erosion, water logging, cattle damage, etc. These 9 blocks have to be handed over to the Public Works Department.

382. *Jurisdictional changes.—Pudupattinam beat.*—The suggestion of the current plan for transferring the Pudupattinam beat to Chingleput division was not carried out. But it was taken from Mannargudi range and allotted to range No. IV at Sirkali for efficient management and supervision since Sirkali is very near to Pudupattinam.

383. *Range.*—It was proposed at the time of reconnaissance report and agreed to transfer the Casuarina plantations in Coleroon padugai (Mudaliamadugu, Alakkudy, Sodiakudy and Gopalasamudram, etc.), under the control of Udayarpalayam range. But this was not given effect to. Instead the same blocks were taken from the old Mannargudi range and allotted to range No. IV at Sirkali to ensure administrative convenience and effective control.

384. Another suggestion prescribed was to abolish the Mannargudi range after distribution of the areas as indicated above (Pudupattinam beat to Chingleput division and Casuarina plantations in Coloroon padugais to Udayarpalayam range) and including the balance areas in Pudukkottai range of Tiruchirappalli division. This suggestion was also not implemented.

385. *Wild Life.*—In G.O. Ms. No. 1821, Agriculture, dated 13th June 1967 the Government have notified an area of 1,728.73 hactare of Kodiakadu reserved forest and its extension as "Point Calimere Wild Life Sanctuary". The Government have also in their order No. 2,871, Agriculture, dated 5th October 1967 approved the proposal of the Chief Conservator of Forests for the acquisition of six patta lands measuring 9.10 hactare within the sanctuary limits. Acquisition was done as per award No. 6/69, dated 18th December 1969 of the Revenue Divisional Officer, Mannargudi.

386. Point Calimere Wild Life Sanctuary is unique in having a large concentration of black buck or Indian antelope which is fast disappearing in many other parts of the country. Other animals commonly found are cheetal, jackal, wild pigs, bonnet monkey, etc.

387. An interesting feature of the sanctuary is the existence of "Wild horses" locally called "Vedaranyankattai" roaming free and breeding. They are said to be the remnants of an indigenous breed of sturdy ponies very much in use in the past for riding as well as transport of salt and fish through the marshes along the coast.

388. The swamps of Point Calimere are of great importance to ornithologists. Flamingoes visit these swamps in thousands during September to February and the vast congregations of these birds with white and pink plumes offer an unforgettable and spectacular display. Other migrants include Garganey teals, Shovellers, Whistling teals, Pintails, Curlews, Avocots, Oyster-catchers, Black headed gulls, Great black backed gulls, Whiskered terns, Litle terns, Casprain terns, Godwits, Golden plovers, Great slon plover, Sand pipers, Little stills, Ringed plovers, Roof harbas, Whimbrels, Red necked phalaropes, white storks, Open billed storks, etc. Large numbers of migratory birds are found in back waters of Muthupet and Talainayar during winter months. A detailed list of birds found in this division has already been furnished in Chapter II.

389. The provisions of the wild birds and animals protection Act 1912 was introduced in Tiruthuraipoondi and Nagapattinam taluks as per G.O. No. 1870, Food and Agriculture, dated 22nd May 1962 communicated in Chief Conservator's Ref. No.55846/61/W1, dated 9th August 1962.

390. The following species of wild water foul and perching birds are declared as protected birds under Wild Birds and Animal Protection Act, 1912 :—

1 Gulls

2 Terns

3 Storks

4 Sand pipers

5 Plovers

6 Stints

7 Pelicans

8 Teals

9 Moorhen

10 Stilts

11 Curlews

12 Pittas

13 Koels

14 Flamingoes

15 Fly catcher

16 Red shanks

17 Kora.

18 Godwits

19 Turnstone

20 Wire tailed swallow

391. The entire taluks of Nagapattinam and Tiruthuraipoondi in the Thanjavur district are closed to shooting, snaring, etc., for the whole year for the following birds:—

1 Gulle
2 Terne
3 Storks
4 Sand piper
5 Plovers
6 Stints
7 Pelicans
8 Teals
9 Moorhen
10 Stilts
11 The curlew
12 Pittas
13 Koels
14 Flamongoes
15 Fly catcher
16 Red shank
17 Kora
18 Godwits
19 Wire tailed swallow
20 Turnstone
21 Egrets
22 Herons
23 Spoon bills
24 Sniper
25 Green pigeons
26 Shovellera
27 Spot bills
28 Ruddy sheldra
29 Pintails.

392. The whole of Pattukkottai range is closed to shooting. There is a regular staff working under the State Wild Life Officer functioning at Kodiakarai and Muthupet, Talainayar, etc., to check illicit poaching and to carry out the Sanctuary works. There is a gate at Agasthiampalli to check and control poaching.

393. *Manamelkudy Forests.*—The current plan precribed planting of cocoanut at 22 feet by 22 feet in Manamelkudy forests at the rate of 40 acres per annum by adopting the local technique. Accordingly 48 hectares of cocoanut plantations have been raised at 16 hectares per annum from 1963–64 to 1965–66. Although stocking in these plantations is satisfactory lack of proper maintenance has resulted in poor growth of the plants. Further planting of cocoanut was discontinued since 1966 and it was decided to pay greater attention to the maintenance of the existing plantations.

SECTION 3—SPECIAL WORKS OF IMPROVEMENTS UNDERTAKEN.

394. The details of special works of improvement carried out in different forests prior to 1956 are furnished below:—

395. *Kodiakadu reserved forests.*—Said-ud-din's plan prescribed the construction of bunds across creeks in Kodaikadu reserved forests to prevent the inrush of sea water into the reserve. It was anticipated that vegetation would establish itself in the grassy swamps if the incursions of tidal waves were checked. After 1938 this was abandoned since the bunds proved ineffective and almost all of them were washed off in no time.

396. In Kodiakadu reserved forests Casuarina plantations were started first in 1942 and continued up to 1946 and by that time 160 acres were planted. The results were not encouraging. Between 1931–32 and 1934–35 cuttings of *Thespesia populnea* were planted in the grassy blanks but only a few out of reach of sea water survived.

397. *Muthupet and Talainayar reserved forests.*—In Said-ud-din's plan digging of channels in areas where the ground level was rising due to fresh accretions and where Avicennia was showing signs of death due to ineffective inundation was prescribed to induce artificial inundation and thereby to prevent mortality of the Avicenia. After few trials this prescriptions was discontinued because of the heavy expenditure involved and the indifferent results achieved.

398. The same Working Plan also prescribed artificial sowing of Avicenia in blanks. This also proved a failure since over areas which were suitable for the establishment of Avicenia there was not difficulty in obtaining natural regeration whereas over areas which were not suited for Avicenia the artificial sowings that were resorted to did not enable Avicenia to establish itself.

399. A boat was purchased at a cost of Rs. 950 for use of the staff for the inspection of Muthupet reserved forest. The boat is in a state of disrepair and therefore not in use.

Artificial regeneration of degraded dry fuel forests.

400. *Conservator's plot of* 1953.—The necessity for the rehabilitation of degraded dry fuel forests by concentrated artificial regeneration methods was recognised so long back as 1887 and several attempts were made by "rab" and "Kumri" methods to regenerate felled coupes in the past. Successful plantations have been raised even in very steep hill slopes. But attention was concentrated only over small areas in favourable localities.

401. After the transfer of the degraded ex-panchayat forests the necessity was keenly felt and Government sanctioned in G.O. Ms. No. 2556, Development, dated 31st July 1953 (communicated in Chief Conservator's No. 4646/53, dated 1st June 1953) the scheme of large scale artificial regeneration in dry fuel forests.

402. The following statement provides the details of plantation raised:—

Range.	*Reserve.*	*Area regenerated.*	*Amount spent.*	*Remarks.*
(1)	(2)	(3)	(4)	(5)
Mannargudi	Veeramangalam	106 acres	1,472-2-0	Ex-Zamin forests

403. *Technique.*—Four feet wide strips in lines 33 feet apart were cleared and soil worked to a depth of 9 inches along the central strip of 2 feet width. Seeds of fuel species were sown in two rows along the strips in July and sowings were repeated every fortnight. Pot plants were also planted in 1 foot cube pits dug 33 feet apart in the strips. It was felt that the rate provided in the estimate was inadequate and as such pits of 1'x2'x6" were dug 5'6" apart between the 1 foot cube pits, instead of 2 feet with strips with the approval of the Conservator of Forests.

404. *Results.*—Though th stocking was statisfactory in December 1953, the plot was declared as failure in April 1954. The failure is attributed to the following causes:—

1. Non availability of seed,
2. Date issue of orders (May 1953),
3. Inadequate attention in selection of sites; and
4. Poor and erratic rainfall.

405. *Conservator's plot of* 1954.—Based on the experience gained in the 1953 plot, orders were issued sufficiently earlier in anticipation of sanction by the Government to select suitable areas and to go ahead with soil working and preparing the areas so as to be ready for sowing by the end of June 1954. A time schedule for various items of work was prescribed in Chief Conservator's No. 37809/58 D2, dated 24th December 1953 and 27th January 1954. This time the target was fixed at 300 acres per range and technique was modified thoroughly.

406. Trenches 5'×6'×6" (depth) were dug 11 apart centre to centre along lines 22" apart and the dug soil was heaped on the lower side of the trench. It was anticipated that the mounds might not be high enough to achieve the object and hence as an experiment the trenches were enlarged to the size 8'×1'×1'×1' over 40 acres. Seeds of fuel species were mixed and sown in the two rows on the mound in June 1954 and were repeated every fortnight.

407. Besides 1 foot cube pits were also dug 33' apart along the lines 22' apart and pot plants were planted after rains and when the ground was moist. Every rain was availed of and the planting was completed by October 1954 when the north east monsoon set in.

408. *Results.*—Plenty of seeds were collected and all the operations were carried out in time. The climatic conditions also proved favourable and the results were satisfactory. Statement below furnishes the details of the area atckled and expenditure incurred up to October 1954:—

Range.	*Locality.*	*Area regenerated.*	*Amount spent up to October 1954.*	*Remarks.*
(1)	(2)	(3)	(4)	(5)
Mannargudi	Keeremangalam	269 acres	5,349-7-0	Ex-Zamin forests.

409. *Bamboo.*—Three hundred bamboo rhizomes have been planted in Mudalaimadugu 1954 Casuarina plantations during the north-east monsoon of 1954. This was a total failure.

410. *Softwood plantations of* 1954.—Softwood species such as *Ailanthus excelsa* and *Salmalia malbarica* have been raised over 29 acres in Keeramangalam Ex-zamin forests which proved to be far from satisfactory.

411. *Grass plot.*—Attempts were made in 1953 to raise fodder grass over one acre in each of the Kodiakadu and Muthupet reserved forests but without success.

412. *Green manure seed farm.*—The moist areas of the plantations that are suitable for intercultivation of Sesbania species was prescribed for raising green manure seeds. Subsequently it was discontinued due to the poor results.

Research:

413. *Permanent preservation plot in Muthupet.*—A plot of 9.60 acres was demarcated as a permanent preservation plot in Muthupet mangrove forest in accordance with the recommendation of the Third Silvicultural Conference held at Dehra Dun in 1929, by clearing a line of 10 width. But all the stand has died during the cyclone of 30th November 1952 along with the surrounding mangrove forests. Subsequently the plot was abandoned.

Details of special works of improvement undertaken during the current plan period in different plantations are furnished below Casuarina plantations :

414. In Casuarina plantations pruning was not prescribed in the unified Working Plan by K. P. D. Rao because it was considered unnecessary and expensive. As per the amendment to paragraph 160 of the unified Working Plan of Thanjavur division, pruning in the Casuarina plantations in the fourth year has been pdescribed (vide—Chief Conservator's K. Dis. 5679/69 D1, dated 2nd January 1969 Conservator's No. 6493/69 T) because there is interlacing of branches in plantations which are more than 3 years old and the persistent branches in the lower part of the stem affects the management of the stand. In the year 1969–70 pruning has been undertaken through contractor's agency in the following plantations and the details of revenue realised are furnished below:—

Range.	*Name of the plantation.*	*Area.*	*Amount realised.*
(1)	(2)	(3)	(4)
			Rs.
Plantation Range No. IV	1966 Pudupattinam	10.92	555.00
	1966 Mndalaimadugu	12.95	375.00
	1966 Sodiakudy	16.59	425.00

194. Some other industries found in the district are pottery, basket making, rattan work and making of fancy boxes of palmyrah leaves, reed thattis and fishing nets. Coleroon is noted for rattan works. One of the industries which has a great potentiality is the fibre industry which is not exploited to the best advantage even though coccanut alone and palmyrah are found in abundance.

195. Toys of different kinds are made at Thanjavur, some of them crude and others artistic. Of the former kind are the well known Thanjavur rocking dolls made of paper and provided with rounded bottoms of clay and the weight of the clay at the bottom makes them assume always an erect position. Of the latter kind are the fine paper toys of realistic appearance of fruits, animals and human beings. There are also goldsmiths, painters, wood carvers and makers of idols. The lapidaries of Thanjavur, Kumbakonam and Vallam work the Vallam crystals into various objects like spectacle lenses beads, coloured stones, etc. The manufacture of crayons at Kumbakonam using gypsum and other small industries like printing and oil pressing deserve special mention.

196. Boat building is common in Muthupet utilising the local timber species such as *Thespesia populnea, Calophyllum inophyllum, casuarina* and *Artocarpus*, along with the imported teak.

197. The Vedaranyam Salt industry near Kodiakadu is a major industry providing job opportunities to a considerable number of people. Salt is manufactured by retaining the sea water to a depth of 60 ems. over a considerable area enclosed by low earthern banks which when the beds are filled are closed to prevent the water from flowing back into the sea. Salt is manufactured from the seamps near Maravakkadu, Manamelkudy, etc., to a small extent.

198. There is a private owned cashew factory at Gandarvakottai which consumes large quantity of cashew nuts. The cashew kernels are separated from the cashew nuts, graded and processed and exported mainly to foreign countries. In works only during the cashew nut season and uses mainly man power for all operations. Shell oil is also extracted here and the shell is utilised as fuel.

199. There are no industries worth mentioning in this district based on forest products.

200. *Lime and brick kilns.*—These are small industries which consume large quantity of firewood. Cheap kind of fuel is preferred for lime kilns. Stumps of dates (*Phoenix humulis*), echan (*Phoenix acaulis*) and kalli (*Euphorbia species*) needles of casuarina, palmyrah leaves, are widely used. Fuel of high calorific value with longer burning capacity is required for brick kilns. Brick kilns consume most of the mangrove fuel. Other species which are commonly used as fuel in brick kiln are tamarind, stumps of palmyrah, kodukapuli, casuarina, etc. There are quite a large number of brick kilns near Muthupet and Coleroon.

201. *Toddy.*—Collection of toddy from palmyrah trees is a popular rural profession at Aranthangi taluk involving a class of people called " Nadars ". They give a slanting cut to the spadix of the inflorescence and the exuding sap is collected in the earthern pots. The interior surface of the pot is coated with a thin layer of lime. Every morning and evening fresh cut and smearing of lime is given by the men folk.

SECTION 2—MARKET AND MARKETABLE PRODUCTS.

202. *Markets.*—The base markets for casuarina fuel removed from departmental plantations are located at Pattukottai, Muthupet, Kumbakonam, Mayuram, Sirkali, Tiruthuraipoondi, Aranthangi, etc. Here the contractors have big depots and they transact business with merchants of distant external market. Casuarina wood has got a ready market at Madras where it fetches higher price than in the local market. The markets for fuel obtained from the mangrove forests are chiefly located at Muthupet

415. Pruning was done to a height of 2.5 metres for trees above 5 metres in height and for trees less than 5 metres in height pruning was restricted to half the height of the trees. Plants less than 2 metres in height were not pruned. Pruning was done by a sharp instrument without damaging the bark of the main stem.

416. Pruning relieves the congestion in the crop, provides aeration, facilitates easy inspection and numbering of plants. Incidentally it gives intermediate revenue also.

417. *Cashew plantations.*—In the older cashew plantations the following intensive maintenance works have been carried out as per G.O. Ms. No. 1702, Agriculture, dated 3rd June 1969 communicated in Chief Conservator's No. 66189/68 J1, dated 30th June 1969 :—

1. All rank growth of miscellaneous thorns and bushes in between cashew plants was cleared and uprooted.
2. Intensive soil working was done around the cashew plants to a width of 3 metres by mammaties.
3. Deep ploughing of the intespaces was done by tractor.
4. Soil conservation measures like contour bunding, construction of waste weirs were done.
5. Plant protection measures were carried out by spraying DDT 5 per cent and sulmite.
6. Application of chemical fertilizers at the rate of 1 Kg. per plant around each plant in the dug out trenches was carried out.

418. All these operations carried out reflected in the increased productivity. The cashew crop generally respond remarkably to these treatments done in time.

419. *Description of soil working.*—Soil was worked by mammaties and pick axes to a radius of 4 feet 6 inches around the stem. In the process of soil working a trench was formed at a distance of about 4 feet 6 inches radius from the plant to a width of 1 foot and a depth of 3 inches to 4 inches. In the 4 feet 6 inches width portion worked soil was mulched with dry leaves.

420. Deep ploughing with tractor (Allis Chalmer) was resorted to in the interspace between the plants. A brief note on the soil working by the tractor is furnished below

Allis Chalmer crawler type tractor (H D6) of 75 Hp was put into operation from January 1970 in the forests of Komapuram reserved land of plantation range No. I for ploughing work. This had ploughed an area of 75.2 ha. in 80 working days (646 hours) and was idle for about 101 days due to repairs, holidays rain etc., upto June 1970. Thus on an average the tractor ploughed one ha. per day. The depth of ploughing was 15 to 20 cms. Fuel consumption per day of 9 hours for ploughing one ha. is 20 litres of diesel and ½ litre of engine oil. The cost of ploughing with this type of tractor works out to Rs. 85 per ha. on an average.

421. Barath Earth Mover "D.80 A8 Bulldozer (crawler type) Tractor Hydraulic type" was purchased at a cost of Rs. 3,58,593—45 and engaged in the forests of Komapuram reserved land from the middle of April 1970 for clearing the jungle growth, levelling the site and formation of bunds around the cashew plantation before pitting work. This had cleared and levelled an area of about 91 ha. in 73 working days (522 hours) and was idle for 62 days upto August 1970 due to holidays and repairs. Thus on an average the Barath Earth Mover clears and levels about 1.25 ha. per day.

422. Fuel consumption per hour for clearing and levelling the site is 14 to 16 litres of diesel oil on an average and ½ litre of engine oil. The cost of clearing, levelling and forming bunds works out to Rs. 84 per ha. on an average.

423. *Cultural operations in Cashew.*—During 1962–63 and 1963–64 cultural operations were carried out i.e. soil working 10' square around the Cashew plots as detailed below:—

Year of Soil working. (1)	*Particulars of plantation.* (2)	*Area in hectare.* (3)	*Amount spent.* (4)	*Remarks.* (5)
			RS.	
1962–63	1958 Neppugai cashew plantation	20·20	540	
1962–63	1958 Komapuram cashew plantation	20·20	302	
1962–63	1960 Ettiathalai	32·37	230	
1963–64	1959 Komapuram	72·84	474	

Soil working not only improved the growth of Cashew plants but also increased the productivity.

424. *Fertilizer application.*—Chemical fertilizer was applied at the rate of 1 Kg. per plant in the dug out trenches of 7 to 10 cms. deep and 30 cms. wide. The trenches were formed at a distance of 1.5 metres from the plant and the ratio of fertilizer mixture applied was 9.9:9 standard mixture. The fertilizer was intimately mixed with soil. The application of fertilizer was carried out before the end of monsoon enabling the plants to utilise the manure with the available moisture in the soil.

425. *Plant protection measures.*—Plant protection measures such as spraying with pesticide DDT 5 per cent and fungicide sulmite at the rate of 125 cms per plant were carried out when the flush of leaves and the flower buds emerge.

426. Intensive maintenance was undertaken for the first time in 1969–70 and the details of plantations in which these works were done along with the cost are furnished below:—

Serial number and Locality of plantations. (1)	*Year of formation.* (2)	*Area in hectare.* (3)	*Amount spent.* (4)	
			RS.	P.
1 Neppugai	1958	20	7,447	64
2 Komapuram	1958	20	5,439	13
3 Komapuram	1959	20	3,872	15
4 Ettiathalai	1960	32	8,425	67
		Total ..	25,184	59

427. In addition the following eqpenditure was also incurred towards the application of chemical manure and on plant protection chemicals during 1969–70 in the cashew plantations.

APPLICATION OF FERTILIZER—

Particulars of the fertilizer. (1)	*Quantity used in* Kg. (2)	*Amount.* (3)
		RS.
1 Super phosphate	19,500	7,435
2 Urea	7,000	6,506
3 Muriate of potash	7,800	4,329
	Total ..	18,270

PLANT PROTECTION CHEMICALS

Particulars of pesticides.	*Quantity in Kg.*	*Amount.*
(1)	(2)	(3)
		RS.
1 Pesticide DDT 5 per cent powder	1,800	1,174
2 Fungicide sulmite	500	1,553
	Total ..	2,727

428. *Machinery.*—In G.O. Ms. No. 1702, Agriculture, dated 3rd June 1969 sanction was accorded for the purchase of a " D-80 A8 Bulldozer (crawler type) Tractor hydraulic type " at a cost of Rs. 3,40,000 under the scheme " Cashew ". The total cost of the tractor including all taxes is Rs. 3,58,593.43. This tractor is put to use in Komapuram and Neppugai for clearing the miscellaneous jungle growth.

TEAK PLANTATIONS :

429. In G.O. Ms. No. 1168, Agriculture, dated 3rd April 1968 staff of one Assistant Conservator of Forests and one peon was sanctioned for a period of one year from the date of appointment for marking tending, thinning and other maintenance operations of teak and other species of avenue and compact plantations raised along canal banks.

430. The cultural operations carried out in teak avenue plantations raised so far include pruning of side branches upto half the height of the tree, cutting climbers and thinning wherever necessary.

431. During tending Dalbergia, Sissoo or Prosopis trees that were interfering with teak have not been thinned in compact plantations. In some avenue plantations miscellaneous trees are dominating over the teak.

432. *Revenue by the sale of thinned material.*—The details of revenue realised by the sale of materials obtained during the cultural operations and the expenditure incurred for the work are furnished in the statement below:—

Name of Range.	*Year of pruning and thinning.*	*Yield obtained.*	*Revenue realised. by sale.*	*Expenditure incurred on pruning and thinning.*
			RS.	RS.
No. I Range	1968-69	2,218 poles.	2,521	4,454
	1969-70	7817 H/L	3,944	2,832
No. II Range	1968-69 1969-70	7006 H/L	3,354	2,174 3,120
No. III Range	1968-69	27 Mis trees	328	3,569
	1969-70	161 H/L	47	2,698
		192 H/L	1,139	
No. IV Range	1969-70	23 H/L	13	392
No. V Range	1968-69	25 tonnes	728	3,986
	1969-70	5542 H/L	2,694	1,169

COCONUT PLANTATIONS—

433. Cocoanut plantations have been raised over 48 ha. at the rate of 16 ha. each year during the years 1963–64, 1964–65 and 1965–66 at an espacement of 22' x 22' in Manamelkudy forests of Pattukottai range.

434. Although stocking in these plantations is satisfactory lack of proper maintenance has resulted in poor growth of the plants. Further extension of cocoanut plantations was discontinued from 1966 and greater attention was paid to the maintenance of the existing plantations.

435. Better maintenance in the form of soil working, replacement of casualties, watering the backward plants, application of chemical fertilizer was done. Barbed wire fencing was provided to a length of 189 chains at a cost of Rs. 6,410.60 during 1969-70 around the plantations to prevent browsing the grazing. The details of expenditure incurred on the three plantations towards annual maintenance are given below:—

Year of plantation. (1)	*Year of maintenance.* (2)	*Amount spent.* (3)
		RS.
1963	1964–65	3,501
	1965–66	3,729
	1966–67	2,539
	1967–68	2,752
	1968–69	4,776
1964	1965–66	4,136
	1966–67	3,635
	1967–68	3,113
	1968–69	1,014
	1969–70	5,008
1965	1966–67	3,323
	1967–68	4,999
	1968–69	941
	1969–70	6,412
	Total ..	49,878

RESEARCH.

436. *Stump planting of Cashew.*—As per Chief Conservator of Forests Ref. No. 2295/61, dated 28 December 1961 stump planting of Cashew was done experimentally over one acre in Ettiathalai in Tiruthuraipoondi range at cost of Rs. 25 during 1964. Most of the stumps died due to drought. Hence further continuance of the experiment was abandoned.

437. *Eucalyptus hybrid.*—During 1962–63 in the coastal areas at Pudupattinam *Eucalyptus hybrid* was planted over an area of 0.8 ha. at a cost of Rs. 441 as an experimental planting which proved to be a complete failure.

Research station at Sholapuram, Thanjavur.

438. The Silvicultural Research Station at Sholapuram on the banks of Coleroon was started with the object of determining the best method of growing teak and other economically useful species on such river and canal banks. The indications are that if teak is stump planted at the break of the monsoon in July-August in good sandy loam, no watering is necessary to establish it. If the soil is purely sandy or clayey or when planting is done late, then watering is necessary till the end of the first summer. Pre-sprouted stumps and the Kumri method have not shown any significant advantages. As this area is subjected to inundation no conclusive results could be drawn.

Cashew was found coming up in Sholapuram research station when introduced as basket plants.

439. *Thanjavur.*—A research station on the banks of the Vennar and Vettar canals near Thanjavur was started and about six exotic species were tried out of which only *Eucalyptus hybrid* was found coming up well. Watering of plants upto March of next year was found necessary for these plants.

440. *Dalbergia sissoo.*—Trials undertaken have shown that the species can be raised by stumps or transplants or container plants. It grows luxuriantly along river banks and canals in good alluvial soils with a high water table. No watering is necessary.

441. *Morusalba (Mulberry).*—This species was tried at Thanjavur but with little success because it does not grow well in sandy soils even with watering. It requires an elevation between 450 metres to 900 metres with an average rainfall of 75 cms to 100 cms.

442. *Inga dulci.*—This species was tried at Thanjavur and the results are that the species if sown direct germinates extremely well but the lanky seedlings rarely survive the first summer. It should therefore be raised only by means of naked transplants, basket plants or stumps. It has come up well in all areas and with watering the growth and survival are good.

443. Species like *Ailanthus excelsa, Ailanthus malabarica, Salmalia malabarica, Albizzia falcata, Albizzia stipulata, Swietenia macrophylla, Cassia javanica,* etc., were tried at Thanjavur and Sholapuram but they all failed to come up.

444. Canes such as *Calamus travancorius, Calmus guruba, Calamus plectocomia-himalayana* have been tried at Thanjavur but they have been browsed heavily resulting in failure.

445. *Fodder grass.*—Fodder species such as *Cenchrus cibiaris* (Kolukattai grass), *Cenchrus glancus* (Glue buffel), *Panicum maximum* (Guinea grass), *Panicum antidotale* (Thin Napier grass), and *Pennesetum purpureum* were tried at Sholapuram *Di taria* with irrigation. *Panicum antidotale* alone was successful. The general indication was that *Panicum antidotale* when transplanted as sets and irrigated came up well. Irrigation was very essential. This species was not found spreading naturally inter establishment.

446. *District experiment.*—One acre of dry blank area in the mangrove forest of Muthupet reserved forest was chosen for experimental regeneration. In November 1958, lines were cleared at 22 feet and babul seeds were dibbled in the lines. Branch cuttings of *Thespesia populnea* were planted at 22 feet intervals along the lines. Germination of babul was profuse and most of the babul seedlings died after the first summer. The speeis also failed to come up.

447. *Wild life.*—Thiru M. Krishnan who was awarded the Jawaharlal Nehru Scholarship has undertaken the faunel survey of "Point Calimere Wild Life Sanctuary".

448. The Bombay Natural History Society under a grant from the Smithsman Institute, Washington has undertaken "Bird banding" and they are at it from February 1968 onwards. The total number of birds banded so far according to their reports in 1962 at Muthupet and Adiramapattinam and 1,149 at Point Calimere as on 6th April 1970 and 1st May 1970 respectively.

Farm Forestry.

449. This is one of the development schemes in the Fourth Five-Year Plan undertaken in this division with the object of creation of village forests in the village common lands to meet the agricultural, domestic and pastoral needs of the rural community. Each Panchayat Union or Development Block is a unit. In order to assess the extent of waste land available a preliminary survey was undertaken by special division under an Assistant Conservator of Forests.

450. Farm forestry scheme was introduced in Thanjavur district in the year 1966. The total area planted so far upto 1969 is 330 ha. in the various Panchayat Unions within the limit of Thanjavur district. The species planted is predominently Karuvel (*Acacia arabica*). The details of farm forestry plantations are furnished below :—

Serial number and locality.	*Name of the block.*	*Year of plantation.*	*Area in hectare.*	*Expenditure.*	*Present condition.*	*Reamrks.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)
				RS.	PER CENT	
1 Karuvadanchery ..	.. Aranthangi	1966	40	6,320	50	
2 Alapirandan ..	.. Do.	1967	40	4,723	60	
3 Volanur ..	.. Avadayar koil.	1967	40	4,856	74	
4 Alapirandan ..	.. Aranthangi	1968	40	5,075	65	
5 Narpavalakudy	.. Do.	1968	40	4,309	75	
6 Narpavalakudy	.. Do.	1969	40	3,736	85	
7 Idayar ..	.. Do.	1969	40	3,314	50	
8 Ponbeti ..	.. Avadayar-koil.	1969	50	4,613	90	

451. The areas selected for planting were tank beds where babul has been raised at a spacing of 3·5 m. × 3·5 m. Although there is satisfactory, stocking rate of growth in most of the plantations is not encouraging, probably due to the excessive salinity of the soil.

452. During 1970, over an area of 40 ha. at Narpavaikudy cashew has been raised at a spacing of 16½′ × 16½′ under the farm forestry scheme since the soil is suitable for that species.

453. There is a farm forestry range at Aranthangi in-charge of a Range Officer. Five foresters have been allotted for the farm forestry regeneration works. A plot mazdoor is engaged for every 50 ha. or more to look after the plantations. Generally this scheme has the support of the villagers in Aranthangi taluk.

Five-Year Plans.

454. Considerable areas were tackled under a variety of schemes during the Second, Third and Fourth Five-Year Plans which have increased the timber and other forest resources of the division to a significant extent. The physical achievements under the different schemes are furnished below :—

Serial number and name of the scheme.	*Area in hectare.*	*Remarks.*
(1)	(2)	(3)
1 Scheme for raising plantations along river, canal and lake fringes—		
Avenue	6,722·06	
Compact	133·82	
2 Scheme for casuarina plantations	360·27	
3 Scheme for raising cashew plantations in forest areas	710·00	
4 Scheme for planting quick growing species	36·00	
5 Scheme for village forests (Farm Forestry Scheme)	370·00	
6 Cocoanut plantations (Economic plantations)	48·57	
Total ..	8,380·72	

455. The results achieved under all the above scheme are satisfactory and encouraging.

Other plantations.

456. *Softwood plantations*.—Softwood species such as *Ailanthus excelsa* and *Salmalia malabarica* were raised in Neppugai ex-zamin forests under the Second Five-Year Plan works. The details are given below :—

Serial number and locality.	*Year.*	*Area planted in hectare.*	*Total cost.*	*Reamrks.*
(1)	(2)	(3)	(4)	(5)
			RS.	
1 Neppugai	1956–57	20·0	2,529	
2 Do.	1957–58	40·0	4,522	
3 Do.	1958–59	20·0	3,870	

457. Salmalia suffered due to the natural dying back of the species and heavy damage from the rabbits. Ailanthus also did not fare any better. Therefore softwood planting was given up in that locality and cashew seeds were dibbled in failed patches. Even with cashew the results were not satisfactory.

458. *Bamboo plantation.*—Bamboo plantations were raised in Nos. I and III Ranges during 1962–63 and 1963–64 at a spacement of 22 feet by 22 feet by planting two year old rhizomes in 2 feet cube pits. The following are the areas planted, expenditure incurred, etc. :—

Locality. (1)	*Year.* (2)	*Area.* (3) HECTARE.	*Amount spent including maintenance.* (4) RS.	*Remarks* (5)
Mudalaimadugu	1956	4·0	..	
Vennar Vettar River acres in I Range	1962–63	4·0	2,469	
Umbalapady and Sarukkudi in II Range	Do.	3·4	1,940	
Thogur in II Range	1963–64	4·0	962	
Thogur	1964–65	4·0	..	
Koilady	1963–64	1·2	333	
Nagathy	1963–64	2·8	444	
Nagathy (Bamboo plantation)	1964–65	4·0	..	

459. Bamboo was raised under Kumri in two plots near Swamimalai, the Kumri crop being plantain. Since the results were poor probably due to the unfavourable soil conditions further attempts at raising bamboo were given up. Dendrocalamus was planted on the soil conservation bunds in Melpanaikadu cashew regeneration areas. Though the survival is satisfactory it has not putforth satisfactory culm production.

460. *Eucalyptus hybrid.*—*Eucalyptus hybrid* was raised in the failed compact teak areas in No. I Range and Pudupattinam coastal area of No. IV Range. Details of area planted with expenditure are furnished below :—

Year. (1)	*Locality.* (2)	*Area in hectare.* (3)	*Expenditure incurred.* (4) RS.	*Remarks.* (5)
1961–62	Kambiarnatham (1959 Teak compact area) I Range	2	342	
1962–63	1960 and 1961 Vettai and 1959 Vennar Vettar River areas in No. I Range.	12	3,400	
1963–64	Kambiarnatham in No. I Range	4·8 }	2,000	
	Nagathy	2·4 }		
1962–63	Pudupattinam coastal area (Experimental planting)	0·8	441	Complete failure.
1963	Mathur	3·2	..	
1963	Nagathy	2·4	..	
1968	Vilangudi	10·5	..	Results are poor.
1968	Maharajapuram	18·56	..	

461. *Eucalyptus hybrid* was raised during 1962 over an area of 2 ha. near Saliamangalam in 1959 failed teak plot. The results are unsatisfactory. Adjacent to this plot *Terminalia tomentosa* was raised which contains patchy stocking and the growth is rather slow.

462. Near Kaveripattinam, *Eucalyptus hybrid* was raised over an area of 0.2 ha. but has failed due to stagnation of water, salinity and unsuitable soil conditions.

463. *Interplanting of Eucalyptus hybrid.*—During 1962 at Keeramangalam, *Eucalyptus hybrid* plants were introduced in Cashew plot (spacing 22 feet by 22 feet) in between cashew lines at 11 feet apart. Initially bare rooted transplants of *Eucalyptus hybrid* were planted and casualties were replaced with container plants. The condition of the surviving plants is satisfactory.

464. ***Sesbania Plot.***—Sesbania was raised in No. I and II Ranges during 1961–62 and 1962–63. The areas planted, expenditure incurred and seeds collected are furnished below :—

Range. (1)	*Year.* (2)	*Area in hectare.* (3)	*Expenditure.* (4)	*Seeds collected.* (5)	*Revenue realised.* (6)	*Remarks.* (7)
			RS.	KGS.	RS.	
I and II Ranges	1961–62	8·0	2,200	1,027	679	..
I and II Ranges	1962–63	14·0	6,391	2,000	1,570	..

The Scheme was abandoned in 1963–64.

465. *Miscellaneous plantation.*—Other species have not been tried on such large scale in the Cauvery system as on Tambaraparani banks. In areas where conditions were found unsuitable for teak, due to water logging, etc., other species such as *Dalbergia sissoo*, *Terminalia tomentosa*, *Terminalia arjuna*, *Syzygium cunini* and *Eucalyptus hybrid* were tried on a very small scale. Sissoo was planted by stumps. In the case of *Terminalia tomentosa* and *Terminalia arjuna* container plants were used. *Eucalyptus hybrid* was transplanted while Syzygium seeds were directly sown. The plants were badly browsed by village cattle. A few plants that escaped damage are doing well. *Dalbergia sissoo* planted in November 1957 in Perambur near Vennar-Vettar river has come up excellently with uniform height growth. The spacing adopted for all these species was 22 feet by 22 feet.

1957–58.

Species raised. (1)	*Name of locality.* (2)	*Area in hectare.* (3)	*Remarks.* (4)
Dalbergia sissoo	Kallaperambur.	0·56	
	Nagathy ..	0·23	
Terminalia tomentosa	Kallaperambur ..	0·08	
Eucalyptus hybrid	Nagathy ..	0·14	
Syzygium cumini	Nagathy ..	0·88	
Terminalia arjuna	Vinnamanglam ..	0·56	
	Nagathy ..	0·32	
	Nagathy ..	0·05	
	Kallaperambur	0·40	
Dalbergia sissoo	Thenperambur	0·85	
Dalbergia latifolia.			
Do.	Rayandur ..	0·95	
Dalbergia sissoo	Allur ..	0·28	

Species raised. (1)	*Name of locality.* (2)	*Area in hectare.* (3)	*Remarks.* (4)
Dalbergia sissoo	Melattur vigethi	0·19	
Do.	Do.	0·25	
Do.	Vizhudaiyur	0·57	
Do.	Rajendram	0·22	
Do.	Malagaithidal.	0·05	
Do.	Thenperambur.	0·36	
Do.	Melathur V Sethi.	0·12	
Do.	Kavalur	0·08	
Do.	Thirukarakavur.	0·52	

466. In the compact block above the Vennar-Vettar headworks consequent to the failure to teak, miscellaneous species like Bamboo, Eucalyptus and Sissoo have been raised.

467. The compact blocks of No. III Range (Tiruchirappalli) of about 36 ha. in all at Kondayampettai. Tiruvalassoli, Penaya puram, Tirumanamedu, Thalakudi, Jayanthinathapuram and Idayathamangalam on the flood banks of Coleroon were originally planted with teak between 1958 and 1960. Due to failure of teak they were restocked with miscellaneous species like Sissoo. *Eucalyptus hybrid* mainly and *Terminalia arjuna* and *Pongamia*. Though as much as Rs. 200 per acre had been spent for restocking with miscellaneous species with regulr watering the results are not good except in Jayanthinathapuram and part of Thiruvalarsolai.

468. During 1963 at Tirumanamedu over an area of 3.4 ha. *Dalbergia sissoo* was raised and handed over to Tiruchirappalli division for further maintenance.

469. *Inga dulce* was raised in Maharajapuram over an area of 4 ha. during 1967 and over an extent of 1.4 ha. in 1968. Kodukapulli along the Babul was raised during 1968 over an area of 4 ha. in the same locality.

470. In the miscellaneous plot at Gopalasamudram (17.8 ha.) *Eucalyptus hybrid* was raised during 1967 over a small area where there is no stagnation of water and it is promising very well. In the same plot in clayey soil where there was stagnation of water Babul was raised and the growth of the same is quite satisfactory.

471. The condition of miscellaneous compact plot near Athugudy raised during 1966 on the banks of Ayyavainar (in Sirkali Range IV) consisting of species such as sissoo, kodukapulli, vagai, etc. is good.

472. *Lac cultivation.*—Lac cultivation was done in Tiruthuraipoondi range. The results of operations carried out are summarized below:—

1961–62—During April to October 1961, 28 trees were infected with 600 lbs. of brood lac. A quantity of 1297 lbs. of stick lac was obtained but the infection was not satisfactory. An expenditure of Rs. 1,874 was incurred for works.

1962–63—During April to October 1962, 500 lbs. of brood lac was used for infecting 100 trees at 5 lbs. per tree. The infection was fairly satisfactory. The work was carried out on the rain trees standing as avenue on Highways road. An expenditure of Rs. 4,274 was incurred for works.

1963–64—Three hundred and twenty-two trees were taken for inspection with an expenditure of Rs. 2,284.

and Pattukottai. Mangrove fuel is in considerable demand for brick kilns due to its high calorific value, with long burning capacity besides its cheap price as compared to casuarina fuel.

203. Gandarvakottai is the basic market for cashew grown in Thanjavur as well as in Tiruchirappalli district.

204. *Marketable products.*—The only marketable produce are firewood, small timber, cashew and minor forest produce.

205. *Firewood.*—The reserved forests of this division cater very little to the needs of the public. The price of the firewood has shot up very much during the last decade since firewood is the major source of fuel for most of the people in villages and towns. Only a small extent of the population use other source of fuel such as kerosine, gas, leco, agricultural waste, cowdung cakes, etc. Kumbakonam and Thanjavur being far away from the forests consume a large quantity of casuarina fuel obtained from the departmental plantations as well as innumerable small private plantations in Pattukottai and other coastal taluks of Thanjavur district such as Sirkali, Mayuram, Nannilam, Nagapattinam, Tiruthuraipoondi. Despite these big consuming centres casuarina wood is exported to Madras city as billets and posts as the price fetched is higher there.

206. The spurt in demand for fuel and firewood is accelerated due to the steep rise in population and the numerous brick and lime kilns that have cropped up all over to cater the requirements of the evergrowing need of the building activities.

207. There is a keen demand for the mangrove fuel for use in the brick kilns. Firewood is sold in market in bulk on weight basis. The population of the Thanjavur district according to 1961 census is 32,45,907. Putting the annual per capita requirement for household consumption at 1.0 tonne the annual firewood requirements of the district for household consumption alone comes to 3.25 lakh tonnes. The industrial establishments and floating population may require roughly another 0.25 lakh tonnes per year.

208. *Small timber.*—Quantity of small timber obtained from forests is meagre which is consumed largely by agriculturists for their uses. Further ryots grow their own timber in their patta lands to meet their demands.

209. *Cashew.*—The main market for cashew is Gandarvakottai. Cashew is one of the most important items of the minor forest produce and the right to collect the usufructs is sold in public auction annually. Cashew kernels are seperated from the shell by manually breaking the nuts and the kernels are graded according to their size, etc. Better grades are tinned for export to foreign countries like America, Russia, Japan, Singapore, Australia, etc. Lower grade is sold in local market. A syrup is extracted from the cashew apples locally. The factory at Gandarvakottai consumes about 25 bags of cashew per day. Shell oil known as CNSL is also extracted. A note on the exploitation of cashew kernel from the nut is furnished in appendix VIII.

210. *Fishing.*—It is one of the important items of minor forest produce in this division along the coastal villages such as Muthupet, Talainayar, Vedaranyam, Kodiakadu, Manamelkudy, Adiramapattinam, Kaveripattinam and they are consumed locally and sold in the nearby shandies besides a large quantity exported to Madras. In Muthupet reserved forest fishing is free in the lagoon as per Chief Conservator's proceedings Misc. No. 136, dated 28th April 1943 to the fishermen of Muthupet and adjoining villages. Fishing in pits, puddles, small streams and portion of the Korayar passing through Muthupet reserved forests is leased out to the Fishermen's Co-operative Society by negotiations. The right to fish in the tanks and streams of Manamelkudy, Chatram forests are sold in auction annually.

473. The lac cultivation in this division has not been successful on the whole.

474. *Fire protection.*—Generally fire seldom occurs in this division and no expenditure was incurred for fire protection works.

Serial number and Year of occurrence of fire. (1)	*Name of Range.* (2)	*Particulars of damage.* (3)	*Remarks.* (4)
1 1957 ..	Mannargudi ..	40 ha. of grass in Thoraikadu was damaged	
2 1961 ..	No. II Range ..	One acre of grassy area was burnt ..	No damage to the forest.
3 1963 ..	Mannargudi ..	2000 sq. ft. in Manamelkudy forest was burnt	Do.
4 1964 April	Do. ..	9·29 sq. metres was burnt	No damage to the Reserved Forest.
5 1964 May ..	....	Only 4 cents was burnt	Leaves of 3 Terminalia arjuna seedlings were damaged.

475. *Roads.*—There are no Forest roads in this division except the approach road to the Forest Rest House at Kodiakadu. The road is not maintained in a satisfactory condition.

476. *Buildings.*—There is only one Forest Rest House in the division which is at Point Calimere. The building was gifted to the Forest department by one Thiru G. Ayyadurai Pillay and subsequently improvements were carried out by the department by providing electricity and other amenities. The rest house is now under the control of the State Wild Life Officer.

477. There is only one Forester's quarters at Kodiakadu and is maintained satisfactorily. One set of combined quarters for a Forest Guard and Watcher was constructed at a cost of Rs. 7,428 during 1959–60.

478. The following new buildings were constructed and particulars of cost, year of construction, etc., are furnished below :—

Serial number and name of the building. (1)	*Locality.* (2)	*Year of construction.* (3)	*Cost of construction.* (4) RS.	*Remarks.* (5)
1 One combined quarters for Forest Guard and Watcher for Muthupet beat staff.	Thuraikadu ..	1961–62	7,078·82	
2 One combined quarters for Forest Guard and Watcher for Chatram beat staff.	Do. ..	1963–64	7,100·60	
3 One combined quarters for Forest Guard and Watcher.	Keeramangalam	1963–64 and 1964–65.	8,701·64	

479. The checking gate at Agasthiampalli was transferred to the control of the State Wild Life Officer.

480. The following buildings were constructed by the State Wild Life Unit and the cost of construction is appended below :—

Serial number and name of the building.	*Locality.*	*Year of construction.*	*Cost.*	*Remarks.*
(1)	(2)	(3)	(4)	(5)
			RS. P.	
1 Forester's quarters	Kodiakadu ..	1969–70	11,487 00	All electrified.
2 Combined quarters for Forest Guard and Watcher.	Do.	1969–70	16,035 25	Do.
3 Chouki gate building	Agasthiampalli ..	1969–70	5,117 05	Do.

481. The details of expenditure on the maintenance of the buildings are furnished below :—

Serial number and Name of the building.	*Amount spent on repairs and maintenance during.*						*Remarks.*
	1964–65	1965–66	1966–67	1967–68	1968–69	1969–70.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			RS.				
1 Foresters quarters at Kodiakadu.	..	..	27 special repairs. 114 ordinary repairs.		602·92 electrification.	300 special repairs.	
2 Combined quarters for Forest Guard and Watcher (Muthupet beat) Block I.	..	..	12·46 special repairs		35 ordinary repairs	290 special repairs.	
3 Combined quarters for Forest Guard and Watcher (Chatram beat) Block II).	..	..	24·92 special repairs.		35 ordinary repairs.	290 special repairs.	
4 Combined quarters for Forest Guard and Watcher at Keezamnagalam.	..	..	..		45 ordinary repairs.	50 ordinary repairs.	
					38 ordinary repairs.	50 ordinary repairs.	
5 Combined quarters for Forest Guard and Watcher at Kodiakadu.	..	..	..		717·04 electrification.	50** ordinary repairs.	

** Clearing the surrounding places and white washing, etc.' should be done.

Territorial changes.

482. Mannargudi Range was under the control of the District Forest Officer, Tiruchirappalli till January 1957 and it was transferred to Thanjavur forest division from 1st February 1957 when the reorganisation of divisions and circles were effected.

483. *Changes in Territorial range.*—During 1957 the old Mannargudi Range with headquarters at Mannargudi was having jurisdiction over the following areas :—

(1) Kodiakadu reserved forests.

(2) The mangrove forests of Talainayar, Muthupet and Pudupattinam.

(3) The Coleroon padugai forests of Maharajapuram, Sodiakudy, Gopalasamudram, Alakkudy and Mudalaimadugu.

(4) Chatram forests of Thuraikadu, Maravakkadu and Manamelkudy; and

(5) Ex-zamin forests of Gandarvankottai, Komapuram, Avanam and Neppugai.

484. The following territorial readjustments have been effected since 1st August 1961 as per Chief Conservator's Proceedings Mis. No. 95/61, dated 3rd June 1961. The forest blocks in Kumbakonam (Maharajapuram block) and Sirkali revenue taluks (Sodiakudy, Gopalasamudram, Alakkudy, Mudaliamadugu and Pudupattinam blocks) were transferred to the control of the Range Officer, No. IV Range with headquarters at Sirkali.

485. The forest areas in Orathanad taluk (Neppugai and Komapuram blocks) were transferred to Range Officer, No. I Range with headquarters at Thanjavur.

486. The headquarters of Mannargudi Range was shifted from Tiruthuraipoondi to Pattukkottai which is more centrally situated and the range was called Pattukkottai Range as per Chief Conservator's CCP. Mis. No. 175/67, dated 4th September 1967.

487. The changes that were effected in the plantation ranges resulting in the shifting of headquarters, jurisdiction and distribution of work are as follows :—

Five special ranges I to V were formed for planting teak and other timber species along the banks of Cauvery and its branches and Tambaraparani, etc.

Name of the Range.	*Headquarter.*	*Ditribution of work.*
Plantation No. I Range ..	Thanjavur ..	Venner System.
Plantation No. II Range ..	Thanjavur ..	Cauvery System.
Plantation No. III Range ..	Tiruchirappalli ..	Cauvery and Coleroon above Grand Anicut and Kattalai Channel.
Plantation No. IV Range ..	Thanjavur ..	Grand Anicut canal.
Plantation No. V Range ..	Palayamcottai ..	Tambaraparani and Vadavar extension channel.

488. Range V was functioning at Palayamcottai from 1956 to June 1959 and after completing the planting work on the Tambaraparani banks and its canals, it moved to Mannargudi in July 1969.

489. The unit in Tiruchirappalli looks after the Cauvery river between the Mettur lake and the Grand Anicut. In 1961 as per CCP Mis. No. 95/61, dated 3rd June 1961 the headquarters of plantation range IV was shifted to Kumbakonam from Thanjavur and the allocation of work among 5 ranges are appended below :—

Name of Range.	*Headquarter.*	*Allocation of work.*
1 Plantation No. I Range ..	Thanjavur ..	Sholasudamanar, Vettar, Pendavaiyar,
2 Planation No. II Range ..	Thanjavur ..	Arasalar, Thirumalairajan, Munikondan and Kodamurutty.
3 Plantation No. III Range	Tiruchirappalli ..	Kattalai Channel (Tiruchirapalli district).
4 Plantation No. IV Range	Kumbakonam ..	Nattar, Veeracholan Mannaiyar, Coleroon South Rajan canal.
5 Plantation No. V Range ..	Mannargudi ..	Pamaniar, Korayar etc.

490. Subsequently the headquarters of the plantation range No. II (Thanjavur) and IV (Kumbakonam) were also shifted to places nearer the planting areas. The following are the changes that have taken place since 1964 resulting in the present condition.

Name of Range.		*Headquarters prior to 1964.*		*Present headquarters.*
Plantation No. I Range	..	Thanjavur	..	Thanjavur.
Plantation No. II Range	..	Thanjavur	..	Kumbakonam.
Plantation No. III Range	..	Tiruchirappalli	..	Tiruchirappalli.
Plantation No. IV Range	..	Kumbakonam	..	Sirkali.
Plantation No. V Range	..	Mannargudi	..	Mannargudi.

491. At present the Thanjavur forest division consists of one territorial range with headquarters at Pattukkottai and 5 plantation ranges as mentioned above, one range for farm forestry scheme with headquarters at Aranthangi.

492. In addition to the above ranges there is a Wild Life Unit with headquarters at Vedaranyam functioning under the control of the State Wild Life Office to check poaching and to carry out the sanctuary works.

493. Consequent on the formation of the new Tiruchirappalli Circle, Thanjavur division is included in this new circle.

SECTION 4—PAST YIELD.

494. Yield figures for the past decade in respect of mangrove fuel, casuarina fuel and cashew usufructs are furnished below which are based on the details furnished by the contractors.

495. Figures of out-turn from minor forest produce working circle are furnished in appendix XI.

STATEMENT SHOWING THE YIELD OBTAINED FROM MANGROVE FUEL COUPE FROM 1957 TO 1970.

Locality. (1)	*Coupe number.* (2)	*Extension hectare.* (3)	*Year of felling.* (4)	*Yield in ton.* (5)
Talainayar	I	95·2	1957–58	..
Muthupet	I	23·4	1957–58	..
Chatram	I	20·4	1957–58	..
Talainayar	II	20·4	1957–58	62½
Chatram	II	94·4	1957–58	..
Chatram	III	16·20	1957–58	..
Coleroon	I	28·8	1957–58	..
Talainayar	III	25·6	1957–58	..
Muthupet	II	125·2	1958–59	..
Muthupet	III	158·8	1958–59	..
Talainayar	IV	21·8	1958–59	..
Coleroon	III	16·7	1958–59	..
Talainayar	V	9·6	1959–60	20
Coleroon	IV	11·6	1959–60	355
Tamarankottai	I	53·82	1960–61	365
Talainayar	VI	23·24	1960–61	32
Coleroon	V	9·4	1960–61	70
Coleroon	VI	12·60	1961–62	76
Coleroon	VII	24·88	1961–62	158
Tamarankottai	II	40·47	1962–63	127·50
Tamarankottai	III	40·47	1963–64	260·50

STATEMENT SHOWING THE YIELD OBTAINED FROM MANGROVE FUEL COUPE FROM 1957 TO 1970.

Locality. (1)	Coupe number. (2)	Extension hectare. (3)	Year of felling. (4)	Yield in ton. (5)
Coleroon	VIII	6·00	1963–64	39
Coleroon	XI	11·40	1966–67	81·28
Coleroon	XII	10·00	1966–67	267·22
Tamarankottai	VII	40·47	1969–70	336·6
Tamarankottai	VIII	40·47	1969–70	388·0
Tamarankottai	IX	40·47	1969–70	116·6
Tamarankottai	IV	40·47	1970–71	..
Tamarankottai	V	40·47	1970–71	..
Tamarankottai	VI	40·47	1970–71	..

NOTE.—1 Ton = 1·016 Tonnes.

STATEMENT SHOWING THE YIELD OBTAINED AND PRICE FETCHED FROM CASUARINA PLANTATION FROM 1956 TO 1969.

Year. (1)	Name of locality. (2)	Area in hectare. (3)	Amount realised. (4) RS.	Yield in ton. (5)
1956–57	Udayamarthandapuram	10·31	2,500	104
1957–58	Sodiakudy	10·31	12,000	205
1957–58	Sodiakudy	4·65	5,650	152
1958–59	Sodiakudy	13·24	21,200	465
1959–60	Mudalaimadugu	9·71	20,600	391
1959–60	Sodiakudy	10·92	15,802	206
1959–60	Alakkudy	2·42	4, 000	60
1960–61	Mudalaimadugu	4·04	14,321	229
1960–61	Sodiakudy	4·84	15,500	190
1961–62	Maharajapuram Bit I	13·20	33,030	283
1961–62	Maharajapuram Bit II	4·16	11,000	101
1961–62	Alakkudy	13·48	4,015	113
1962–63	Alakkudy	7·68	14,200	381
1962–63	Udayamarthandapuram	10·11	6,075	..
1964–65	Udayamarthandapuram	4·05	6,000	121½
964–65	Sodiakudy	14·16	16,100	285½
1965–66	Sodiakudy	18·49	8,350	150
1966–67	Mudalaimadugu	12·95	19,425	247½
1967–68	Maharajapuram	21·44	17,550	250
1967–68	Pudupattinam	4·45	3,555	51
1967–68	Mudalaimadugu	16·33	26,710	400
1967–68	Alakkudy	6·07	6,505	59
1967–68	Sodiakudy	8·09	9,050	50½
1967–68	Udayamarthandapuram	15·58	11,525	144

STATEMENT SHOWING THE YIELD OBTAINED AND PRICE FETCHED FROM CASUARINA PLANTATION FROM 1956 TO 1969—*cont.*

Year. (1)	*Name of locality.* (2)	*Area in hectare.* (3)	*Amount realised.* (4) RS.	*Yield in ton.* (5)
1968–69	Kambaiyarnatham	1.25	3,000	23
1968–69	Koilady	4·47	1,970	39
1968–69	Maharajapuram	18·55	12,800	121
1968–69	Puthupattinam	9·20	13,785	180
1969–70	Kambaiyarnatham	0·76	345	..
1969–70	Puthupattinam	8·36	11,015	..
1969–70	Alakkudy	8·90	26,125	..

NOTE.—1 Ton = 1.016 Tonnes.

STATEMENT SHOWING THE YIELD OBTAINED FROM CASHEW PLANTATION FROM 1963 TO 1969.

Year of formation.	*Name of locality.*	*Area in hectare.*	*Yield.*					
			1963–64.	1964–65.	1965–66.	1966–67.	1967–68.	1968–69.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1956 and 1957.	Neppugai	60·72	..	..	..	..	1,219½ Kg.	442 Kg.
1958 ..	Komapuram ..	20·24	145 Kg.	1,042 Kg.	..	954 Lit.	552 kg.	560 Kg.
1958 ..	Neppugai	20·24	45·45 Kg.	260 kg.	604 Lit.	706 Kg.	1,414 Kg.	994 Kg.
1959 ..	Komapuram ..	72·85	..	9,004 Lit.	..	864 Lit.	1,445 Kg.	1,616 Kg.
1960 ..	Ettiathalai ..	32·38	..	..	..	..	981 Kg.	139 Kg.
1961 ..	Senthangudy ..	40·47	..	..	..	..	91 Kg.	31½ Kg.
1961 ..	Kurumbur ..	40·47	..	..	..	..	1,065 Kg.	328 Kg.
1962 ..	Melpanaikadu ..	40·47	..	..	..	30 Kg.	151 Kg.	14·5 Kg.
1964 ..	Melpanaikadu ..	12·00	..	..	..	..	186 Kg.	74 Kg.
1965 ..	Keeramangalam ..	20·00	..	..	..	..	..	56 Kg
1966 ..	Keeramangalam ..	20·00	..	..	..	..	..	..
1967 ..	Komapuram ..	40·48	..	..	..	..	..	..

Section 5—Past revenue and expenditure.

496. The revenue and expenditure figures for a period of **14 years from 1956–57** to 1969–70 are furnished below. The chief source of revenue is from **fuel accounting for** about 40 per cent. The general increase in expenditure during the **decade is attributed** to major development schemes taken up under the Five-Year Plans.

497. An abstract of the financial position is furnished below **which shows that the** division continues **as a** deficit division because of the heavy **investment** on **development** schemes.

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Statement Showing the Revenue and Expenditure for Thanjavur Forest Division from 1956–57 to 1969–70.

Serial number.	Year.	Revenue.		Expenditure.				Total expenditure.		Surplus (+) or Deficit (—)		Remarks.
				Works.		Establishment.						
(1)	(2)	(3)		(4)		(5)		(6)		(7)		(8)
		RS.	P.	RS.	P.	RS.	P.	RS.	P.	RS.	P.	
1	1956–57	..		794	00	4,761	00	5,555	00	(—) 5,555	00	
2	1957–58	52,176	00	1,79,329	00	20,438	00	1,99,767	00	(—) 1,47,591	00	
3	1958–59	73,775	00	2,16,647	00	1,00,377	00	3,17,024	00	(—) 2,38,249	00	
4	1959–60	74,172	00	2,51,009	00	20,246	00	2,72,225	00	(—) 1,97,053	00	
5	1960–61	64,363	00	2,14,174	00	27,241	00	2,41,415	00	(—) 1,77,052	00	
6	1961–62	1,05,832	00	1,41,419	00	1,16,401	00	2,57,820	00	(—) 1,51,988	00	
7	1962–63	47,886	00	2,56,265	00	29,652	00	2,85,917	00	(—) 2,38,031	00	
8	1963–64	17,862	00	1,57,995	00	1,36,467	00	2,94,462	00	(—) 2,76,780	00	
9	1964–65	26,210	00	2,18,472	00	1,42,825	00	3,61,297	00	(—) 3,35,087	00	
10	1965–66	46,085	00	1,97,312	00	1,66,745	00	3,64,057	00	(—) 3,17,972	00	
11	1966–67	46,425	00	1,58,576	00	2,06,280	00	3,64,856	00	(—) 3,18,431	00	
12	1967–68	1,03,725	00	2,49,358	00	2,13,240	00	4,62,607	00	(—) 3,58,882	00	
13	1968–69	81,042	00	2,92,591	00	2,55,934	00	5,48,525	00	(—) 4,67,483	00	
14	1969–70	98,239	00	6,63,440	00	3,10,301	00	9,73,741	00	(—) 8,75,502	00	Expenditure during 1969–70 is very high since tractor was purchased at a cost of Rs. 3·5 lakhs.

498. The details of Revenue and Expenditure of Thanjavur forest division from 1956–57 to 1969–70 are furnished below:—

STATEMENT OF RECEIPTS, THANJAVUR DIVISION.

Head of Account.	1956–57.	1957–58.	1958–59.	1959–60.
Forest receipts—	RS.	RS.	RS.	RS.
1 Agency Sandalwood	..	..	..	22·99
Firewood and Charcoal	..	..	19·00	6,166·61
Other minor produce	..	..	..	85·90
(*a*) Firewood and Charcoal	725·00	34,551·50	65,517·50	62,101·50
(*b*) Grazing and Fodder grass	55·02	485·67	1,300·03	1,090·18
(*c*) Other minor produce	..	3,155·00	4,914·00	1,428·00
2 Drift and waifwood confiscated produce ..	..	9·31	72·40	152·22
3 Receipts from the management of Ex-zamin estates.	43·11	12,309·04	4,311·28	1,403·63
4 Miscellaneous :				
Fines and forfeiture	61·00	1,316·00	1,033·00	857·50
Rent on buildings	..	..	17·25	50·56
Other sources	31·00	349·18	1,590·22	806·66
Deduct refunds	..	..	..	..
Grand total receipts ..	915·13	52,175·70	78,774·68	74,172·14

STATEMENT OF REVENUE.

Name of division.	Head of Account.	1960-61.	1961-62.	1962-63.	1963-64.
(1)	(2)	(3)	(4)	(5)	(6)
		RS. P.	RS. P.	RS. P.	RS. P.
	Receipts.				
Thanjavur division. ..	.. X. (*a*) Timber and other produce removed from the forests by Government agency :				
	Sandalwood	89·70	74·07	259·00	..
	Firewood and charcoal	3,400·50	3,280·50	2,948·00	1,472·50
	Other minor produce	44·00	..	65·00	12·00
	(*b*) Timber and other produce removed from the forests by consumers and purchasers :				
	Firewood and Charcoal	55,250·75	90,154·00	27,064·62	570·75
	Grazing and fodder grass	1,054·03	1,336·45	754·89	837·05
	Other minor produce	804·00	1,156·75	3,355·00	1,770·00
	(*c*) Drift and waifwood and confiscated products	76·52	164·13	72·06	227·33
	(*d*) Receipt from the management of Ex-zamin forests	3,343·44	6,300·00	8,605·58	5,495·21
	(*e*) Miscellaneous :				
	Fines and forefeitures	1,896·47	405·50	278·00	98·50
	Rents on buildings	145·80	152·22	166·72	203·62
	Other sources	2,093·60	2,208·45	4,317·08	7,024·09
	Total ..	68,198·81	1,05,832·07	47,885·95	17,711·05
	Deduct: Refunds of revenue by Forest Officers ..	3,835·45	..	..	29·06
	Net Revenue ..	64,363·36	1,05,832·07	47.885·95	17,681·99

211. Tanning materials such as avaram bark, konnai bark are sent to Madras. All other items of minor forest produce such as tamarind, kala fruits, vila, sundaikai, illuppai, ettikai, soapnut, seekai, elanthai, honey and wax, pungam and neem and naval fruits are consumed locally and sold in nearby shandies. The right to collect and remove the usufructs of palmyrah trees in Manamelkudy is sold in open auction. Cocoanut from the topes in padugais of Sirkali, Mayuram, Tiruthuraipoondi, Pattukottai and Aranthangi taluks are consumed locally to some extent and exported to outside markets also. Many fruits grown on the groves and gardens of private holdings are consumed locally. The usufructs and leaves of palmyrah grown in forests as well as in private lands are utilised locally.

SECTION 3—LINES OF EXPORT.

212. The division is well served with a network of roads, railways and sea.

213. *Railways.*—The following main and branch lines traverse the division:—

1. Tiruchirappalli—Madras	Main line
2. Tiruchirappalli—Erode	Broad gauge line

Branch line :

1. Mayuram—Tranquebar	Metre gauge.
2. Tiruthuraipoondi—Point Calimere	,,
3. Mayuram—Peralam—Karaikal	,,
4. Thanjavur—Needamangalam—Tiruvarur—Nagur ..	,,
5. Needamangalam—Mannargudi	,,
6. Tiruvarur—Tiruthuraipoondi	,,
7. Tiruthuraipoondi—Pattukkottai—Aranthangi—Karaikudy.	,,

214. *Roads.*—The division is well served with a network of roads which are generally in good condition.

215. *Trunk roads.*—The southern trunk road from Madras closely follows the railway through Tiruchirappalli. Other important trunk roads are Tiruchirappalli-Thanjavur-Kumbakonam-Mayuram-Chidambaram road and Tiruchirappalli-Ariyalur Chidambaram road.

216. *Other roads.*—Throughout the district there is a network of feeder roads which serve to transport forest produce from the site of exploitation to the trunk roads. Pattukottai range is well served by a network of district and other roads radiating from rail heads which facilitates transport of fuel. All the roads are kept in good condition by the Highways department. There are no forest road in the division.

217. *Waterways.*—Both Talainayar and Muthupet reserved forests are connected to the local markets by navigable channels. There are the Adappar and Nellar rivers in Talainayar in addition to Vedaranyam-Nagapattinam channel and Koraiyar, Paminiyar in Muthupet reserved forest which are navigable. Fuel exploited from mangrove forests of Muthupet is transported by boats through rivers, streams and lagoons to the mainland.

SECTION 4—METHODS OF EXPLOITATION AND THEIR COST.

218. All the forest products are collected by contractors using manual labour. No machinery or modern tools are used for exploitation.

Firewood:

219. (*a*) *Miscellaneous fuel.*—Mangrove forests of Talainayar and Muthupet reserved forests are the only fuel coupes of this division. The fuel coupes are sold standing to the contractors in open auction. The contractors bid for the whole area of the coupe. The contractors use manual labour for exploitation. Only bill hooks and axes are used for felling. The stems are felled, and stacked after billeting. Payment for felling, stacking and transport is made by the contractor on the basis of stacked volume. The local stacks measure 1 m × 1 m × 1 m containing a stacked volume of 1 m^3 firewood and three such stacks weighing approximately about one tonne. After transport by boat they are transported by bullock carts to the nearby local markets. The cost of exploitation per tonne is as follows:—

Mangrove fuel.

Name of the place.	*Cost of felling and billeting.*	*Stacking.*	*Loading and un-loading.*	*Transport to the nearest market.*		*Super-vising charges.*	*Total.*	*Shelling rate.*	*Remarks.*
				Lead.	*Cost.*				
	RS.	RS.	RS.			RS.	RS.	RS.	
Muthupet	6	2	3	16 km (10 km by boat, 6 km by cart) By boat Rs. 6. By cart Rs. 4.	15	3	29	50	*

*Transport by water and road.

Mangrove fuel is sold at Muthupet at the following rates:—

Billets	Rs. 45 to	Rs. 50 per tonne.
Boles	Rs. 60 to	Rs. 70 per tonne.

220. (*b*) *Casuarina fuel.*—Casuarina plantations are worked through the agency of contractors who organise labour to fell and remove the trees. Casuarina coupes of this division lie mainly on the plain portions and there is a good system of roads which facilitates exploitation and transport of firewood. Inside the coupes the contractors generally lay out extraction paths. Hand saw is used for felling the trees and billeting and bill hooks are used for pruning the side branches. The trees which are long and straight are transported and sold as poles. The other trees are sawn into billets of about 1 metre length and stacked and transported by bullocks carts to the nearby markets. Casuarina is usually stacked in 3 m long, 1.2 m tall and 0.6 m broad stacks each stack being taken as one tonne for purposes of trading. The cost of exploitation per tonne is as follows:—

Name of the place.	*Cost of felling and billeting.*	*Stacking.*	*Loading and un-loading.*	*Transport to the market place or market.*		*Supervision charges.*	*Total.*	*Shelling rate.*	*Remarks.*
				Lead.	*Cost.*				
	RS.	RS.	RS.			RS.	RS.	RS.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Pudupattinam.	8	2	2	15 km.	18	3	23	130	
Udayamarthandapuram.	8	2	2	20 km.	15	3	30	120	
Maharajapuram.	8	2·50	2	16 km.	8	2·50	23	130	
Sodiakudy	8	2	2	5 km.	5	2	19	120	
Aiakkudy	8	2	2	6 km.	6	2	20	130	

221. The contractors of casuarina coupes have to clearfell all the miscellaneous growth and bushes in the plantations. In recent years there is a steep increase in the price of firewood in markets coinciding with the general increase in living cost. The price of casuarina fuel (split) at Thanjavur and Kumbakonam is about Rs. 140 per tonne. The cost of a well grown good sized, straight casuarina pole varies from **Rs.** 3 to **Rs.** 80 since it is used as constructional timber as post, ridge piece, scaffolding material, mast for boat etc., and for punting the country boat.

222. *Cashew.*—The right to collect cashew nut from the cashew plantations is being leased out anuually to contractors who engage necessary staff and labour for protection, collection and marketing. The fruits with the nuts are collected from the trees before they fall after ripening. The nuts are removed from the fruits manually, dried and sold. The fruits are sold in the villages and nearby towns and the unsold fruits are heaped up and rotted for manure. The cost of collection per bag is furnished below:—

Cashew (per bag of 80 Kg. of cashew nut).

Name of place.	*Collection charges of fruits from trees including protection.*	*Separation of fruits from nuts & drying.*	*Transport charges to the forest depot from individual trees.*		*Spliting cashew manually.*	*Supervising*	*Total.*	*Shelling rate.*	*Remarks.*
			Lead.	*Cost.*					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	RS.	RS.		RS.	RS.	RS.	RS.		
Komapuram **Neppugai**	10	1	10 km. 10 km.	1	10	1	23	12 per kg. kernel.	**
Melpanaikadu **Sethengudy**	10	1	25 km.	1·50	10	1	23·50		
Kurumbur **Ettiathalai**	10	1	30 km.	2	11	1	25		

** 80 kg. of nuts will yield 16 kg. to 20 kg. of kernels.

** Transport by water and road.

223. *Other minor forest produce.*—The right to collect the minor forest produce is leased out to the contractors annually in open auction. The lease period is from 1st July to 30th June of the succeeding year. Economically important forest produce like avaram bark, elendai, cowdung, parlmyrah and cocoanut leaves are sold separately, each reserved forest being the lease unit. The right of fishing in the tanks and streams of Manamelkudy-Chatram forests is sold as a separate unit by the District Forest Officer.

224. Fishing in Talainayar reserved forest and adjoining unreserves is leased out by the Revenue department annually. The right of fishing in Muthupet reserved forest is given on negotiation to the Fishermen's Co-operative Societies. The cost of collection and the market price for some of the minor forest product is furnished below:—

Name of the produce.	*Collection charges.*	*Selling rate.*
(1)	(2)	(3)
	Rs. P.	Rs. P.
1 Elendai	0-15 per litre.	0-30 per litre.
2 Sundaikai	0-15 ,,	0-30 ,,
3 Avaram bark	0-15 ,,	0-30 ,
4 Neem seeds	0-10 ,,	0-20 ,
5 Pungam seeds	0-15 ,,	0-25 ,,
6 Cowdung	0-25 per basket.	0-50 per basket.
7 Echan	0-20 per litre.	0-30 per litre.

225. *Grazing.*—The grazing year commences from 1st July to 30th June of the succeeding year. Grazing is regulated by issue of permits. The grazing fees currently levied areas as follows per head of cattle:—

Buffaloe	2-00
Horse, cow and bull	1-00
Sheep	0-50

226. Plantations and worked fuel coupes are closed to grazing for a period of 5 years including the year of formation or felling.

227. There are no minerals worth mentioning in this district.

SECTION—5—PAST AND CURRENT PRICES.

228. *Firewood.*—A detailed statement showing the areas sold and price per hectare obtained from the mangrove fuel coupes of the division from 1955-56 to 1969-70 is furnished in appendix IX. The maximum price was obtained during 1959-60 i.e., 83.6 ha. fetched a sum of Rs. 18,000 which works out to Rs. 215 (approx) per ha. Coupe No. IV, V and VI were not sold since 1964 due to lack of demand but in 1970 the same coupes fetched a reasonable price probably due to the fact that the contractors were allowed to transport the cut materials through boats. Further with the opening of brick kilns around Muthupet the mangrove coupes fetch better price.

229. *Casuarina fuel.*—Details of casuarina coupes sold and revenue realised each year from 1956-57 to 1969-70 are given in appendix X. The average price per hectare during 1969-70 was Rs. 2,077 as against Rs. 1,222 per ha. obtained during 1964-65 which indicate the upward trend of price for casuarina fuel due to the increasing demand.

230. *Minor forest produce.*—A statement of revenue obtained by sale of different minor forest produce from 1956-57 to 1968-69 is provided in appendix XI.

231. The lack of demand for the minor forest product in this division has resulted in the steady and gradual decline of price during the recent years. During 1958-59 an amount of Rs. 4,914 was realised which is by far the maximum as against Rs. 962 obtained during 1968-69.

232. *Cashew usufructs.*—Revenue realised from the sale of cashew usufructs is furnished under paragraph 327 in Chapter V.

233. *Fishing leases.*—Crop failure due to vagaries of monsoon and climate, increased realisation of food value of fish and general increase in population are some of the factors which contributed to stepping up of the prices in the fishery leased during the recent years. Paragraph 345 of chapter V furnishes the revenue realised by the sale of different fishery units from 1956-57 to 1969-70.

STATEMENT OF REVENUE.

Name of division. (1)	*Head of Account.* (2)	1964-65 (3)	1965-66 (4)	1966-67 (5)	1967-68 (6)	1968-69 (7)	1969-70 (8)
		RS. P.	RS. P.	RS. P.	RS. P.	RS. P.	RS. P.
Thanjavur division	*Receipts.*						
	(a) Firewood and charcoal	1,389·87	206·00	197·00	1,614·50	..	1,808·00
	sandalwood	..	..	16·00	1,888·90	1,040·00	750·00
	Other minor products	..	..	294·00	1,423·50	9,921·00	2,085·00
	(b) Firewood and Charcoal	13,550·00	33,749·00	33,561·00	20,197·25	51,952·00	40,922·00
	Grazing and Fodder grass	1,546·50	2,503·00	2,065·00	1,781·50	1,143·00	945·00
	Other minor products	2,499·00	3,336·00	1,771·00	7,169·50	2,163·00	1,649·00
	(c) Drift and waif wood and confiscated produce.	154·11	99·00	76·00	174·56	176·00	192·00
	(d) Receipt from management of the Ex-zamin forests.	2,002·24	..	2,381·00	5,225·08	6,804·00	40,167·00
	(e) Miscellaneous :						
	Fines and forefeitures	255·50	300·00	478·00	820·60	249·00	385·00
	Rents on buildings	142·05	143·00	168·00	59.87	14·00	127·00
	Other sources	4,670·80	3,886·00	5,418·00	4,722·35	7,580·00	9,209·00
	Total	26,210·07	46,311·00	46,425·00	1,04,037·89	81,042·00	98,239·00
	Deduct refunds of Revenue by Forest Officers	....	226·00	44·10	313·35	....	....
	Net Revenue ..	26,210·07	46,085·00	46,380·90	1,03,724·54	81,042·00	98,239·00

STATEMENT OF EXPENDITURE—THANJAVUR DIVISIO .

Head of account.	1956–57.		1957–58.		1958–59.		1959–60.	
(1)	(2)		(3)		(4)		(5)	
	RS.	P.	RS.	P.	RS.	P.	RS.	P.
10.b. Conservancy and works :								
Ordinary areas	434 160	13 08	4,602	17	5,792	25	19,108	33
10.d. Ex-zamin conservancy and works ..	335	06	3,484	93	3,588	99	4,088	52
65.A.i. Construction of residential accommodation.	..				..		7,348	00
65.A. Capital outlay on Forests :								
3. Cashew plantation	0	09	545	03	2,418	95	3,778	25
4. Expansion of planting activities of valuable commercial timber.	71	08	101	95	15	50	..	
5. Matchwood plantation	505	15	3,366	13	2,075	21	..	
7. Extension of Casuarina plantation ..	394	04	7,971	63	8,470	27	8,487	16
9. Creation of river, canal and lake fringe forests.	12,114	01	89,049	32	1,94,285	99	1,22,511	89
10.c. Establishments :								
Ordinary areas	375	09	4,274	16	4,024	41	20,246	04
10.d. Expenditure in connection with Ex-zamin forests.	662	06	5,272	22	5,320	40	1,054	73
10.c.B. Extension of Causatina plantations ..	1,531	06	10,892	08	11,929	99	739	94
Second Five-Year Plan	..		..		..		1,147	43
10.c. Establishment :								
M. Matchwood plantations	90	02	1,155	84	2,098	15	..	
10.M. River, canal and lake fringe forests ..	27,979	05	69,051	78	77,004	40	82,714	74
Total Receipts	44,650	92	1,99,767	24	3,17,024	42	1,60,925	03
	915	13	52,175	70	78,774	68	74,172	14
Deficit	43,735	79	1,47,591	54	2,38,249	74	86,752	8

STATEMENT OF EXPENDITURE.

Name of division. (1)	Head of Account. (2)	1960–61. RS. P. (3)	1961–62. RS. P. (4)	1962–63. RS. P. (5)	1963–64. RS. P. (6)
	Expenditure.				
Thanjavur division	70 (*b*) Conservancy and works	15,768·73	14,918·15	18,743·79	31,549·25
	70. (*c*) A. District Establishment	27,241·30	27,550·09	28,725·37	1,33,939·52
	District Establishment (MFP. Lac cultivation)	..	1,011·69	1,779·15	2,525·62
	District Establishment Extension of Casuarina Ordinary areas	1,503·06	1,262·82	1,377·98	232·00 (till June 1963)
	N. Training of staff	..	..	..	305·25 (from 8th Ocober 1963)
	Soil conservation in low hill areas	93·08	..	..	..
(2nd Plan)	Creation of River Canal and Lake fringe forests	89,362·25	96,844·21	99,265·95	15,834·17
	H. Cashew cultivation	702·55	630·52	926·90	142·00 (till June 1963)
	Expenditure in connection with Ex-zamin forests	..	..	..	..
	Conservancy and works-Miscellaneous	664·90	..	..	..
(2nd Plan)	Construction of residential accommodation	..	..	..	..
	3. Cashew plantation	4,532·59	226·00	527·00	....
	7. Expansion of Casuarina plantation	12,638·65	1,984·39	..	..
	9. Creation of river Canal and lake fringe forests	88,907·40	30,567·54	2,022·62	..
(3rd Plan)	2. Scheme for cashew plantation	..	4,174·93	6,160·23	1,071·38
	5. Scheme for casuarina plantation	..	10,312·74	14,126·36	11,740·75
	8. Scheme for creation of river Canal and Lake fringe forests ..	..	54,119·05	1,09,688·45	1,03,400·78
	13. Scheme for Nature conservation	..	288·46	29·86	..
	14. Scheme for Minor Forest Produce	..	864·34	2,494·66	2,283·07
	21. Scheme for construction of buildings	..	13,064·92	58·00	7,898·11
	10. Scheme for Forest consolidation	..	..	..	54·00
	Total ..	2,41,414·51	2,57,819.85	2,85,917·32	3,10,975·90

Thanjavur division ..	.. 70-*b*. Conservancy and works	33,848 32	38,418 00	14,611 00	25,058 41	13,889 00	25,729 00
	River Canal and Lake Fringe forests ..	..	..	..	..	6,419 00	..
	70-*c*. A. District Establishment	1,39,924 89	1,63,146 00	..	2,13,249 03	..	2,49,288 00
	B. Scheme for cashew planting (Fourth plan).	..	..	5,706 00	..	..	..
	D. Establishment	..	..	1,99,555 00	..	..	..
	Establishment (Non-Plan)	..	..	..	..	2,55,934 00	..
	H. Scheme for cashew	..	..	..	..	..	18,932 00
	K. Village forests	..	..	..	..	..	24,943 00
	h. Scheme for plantations along river, canal and lake lands.	..	..	..	..	..	2,113 00
	T. Scheme for planting quick growing species.	..	..	..	..	..	2,823 00
	Scheme for training of staff	..	..	..	..	..	85 00
	Scheme for Ceylon repatriates rehabilitation.	..	..	..	..	..	1,939 00
	Starting of Tea Plantation on developmental basis.	..					
	70.*e*. Development Scheme	29,000 24	..	..	24,910 55	..	..
	Development scheme—Lac Establishment.	..	3,599 00	..	..	..	..
	Development establishment—S.E. Village forests (Fourth Plan).	..	..	6,730 00	..	..	..
	E. Village forest	..	..	..	14,673 30	..	..
	U. Quick growing species	..	..	..	406 55	..	..

STATEMENT OF EXPENDITURE.

Name of division.	*Head of account.*	1964–65.		1965–66.		1966–67.		1967–68.		1968–69.		1969–70.	
(1)	(2)	(3)		(4)		(5)		(6)		(7)		(8)	
		RS.	P.	RS.	P.	RS.	P.	RS.	P.	RS.	P.	RS.	P.
	Expenditure.												
	Development scheme (Schemes for cashew cultivation).	..		..		..		..		26,139	00	7,743	00
	Development scheme for village forests.	..		..		..		..		16,082	00	..	
	Development scheme for quick growing species.	..		..		..		..		2,858	00	..	
	Development F. Creation of river canal and lake lands.	..		..		..		..		..		3,405	00
	Development scheme—scheme for timber operation and forest utilisation.	..		..		..		..		..		30	00
	119.e. 2. Scheme for cashew plantation ..	2,351	27	5,001	00	..		1,80,746	44	..		..	
	5. Scheme for casuarina planting ..	14,973	42	22,177	00	..		3,563	10	..		..	
	8. Scheme for R.C.L.F.	1,63,557	44	1,28,418	00	..		..		..		..	
	12. J.M.F.P. Lac	2,997	04	3,298	00	..		..		..		..	
	25. Scheme for construction of building.	745	53	..		..		..		..		..	
	119 *a*. Third Plan Works	..		..		42,163	00	..		2,834	00	..	
	Organisation, Improvement and Ex-zamin forests.	..		..		..		..		..		91,012	00
	119 *d*. Fourth Plan Works	..		..		96,092	00	..		2,24,370	00	..	
	Development scheme—Forest regenaration.	..		..		..		..		..		5,46,699	00
	Total	3,87,408	15	3,64,057	00	3,64,756	00	4,62,607	38	5,48,525	00	9,74,741	00

CHAPTER VI—STATISTICS OF GROWTH AND YIELD.

Section 1—Statistics relating to teak.

498-A. In order to ascertain the rate of growth of plantation teak, measurements of girth at breast height over bark and height in different avenue as well as in compact plantations of all the ranges of Thanjavur division were carried out by 10 per cent random enumerations. The average girth and height for all plantations were calculated arithmetically and the results are tabulated below :—

AVERAGE GIRTH OVER BARK AT BREAST HEIGHT AND HEIGHT OF TEAK AVENUE.

		I		II		III		IV		V		*Total.*		*Average.*	
Serial No. (1)	*Year of plantation.* (2)	*Girth in cm.* (3)	*Height in m.* (4)	*Girth in cm.* (5)	*Height in m.* (6)	*Girth in cm.* (7)	*Height in m.* (8)	*Girth in cm.* (9)	*Height in m.* (10)	*Girth in cm.* (11)	*Height in m.* (12)	*Girth in cm.* (13)	*Height in m.* (14)	*Gerth in cm.* (15)	*Height in m.* (16)
1	1956 ..		..	67	8·50	85	12·00	75	8.00	..	..	227	28·50	56 75	7.15
2	1957	60	10·00	62	8·10	74	12·50	70	7.50	..	..	266	38.60	66.50	9.65
3	1958 ..	55	9·00	63	7·60	86	15·00	72	7.40	..	..	295	39.00	73.62	9.75
4	1959 ..	50	8·00	54	7·40	62	12·50	67	7.30	71	7.19	304	35.20	60.80	7.04
5	1960 ..	46	7·5	53	6·75	61	12·0	60	6.80	66	6.94	286	39.99	57.25	8.00
6	1961 ..	40	6·5	46	6·70	48	8·0	49	6.50	47	6.04	230	33.74	45.20	6.80
7	1962 ..	38	5·5	44	6·20	52	7·5	53	6.20	32	5.53	219	30.93	43.80	6.20
8	1963 ..	35	5·0	43	5·30	63	7·0	38	5.20	51	5.19	203	27.62	40.60	5.40
9	1964 ..	30	4·5	43	5·15	32	6·5	37	5.10	39	5.11	181	26.36	36.20	5.27
10	1965 ..	23	4·0	43	4·90	18	4·0	19	4.80	34	4.77	137	22.47	27.40	4.50
11	1966 ..	20	3·0	23	4·35	16	3·0	16	4.30	21	4.03	96	18.68	19.50	3.74
1	1967 ..	18	2·5	23	4·20	13	2·5	14	4.20	23	4.14	91	17·54	18.20	3.50
13	1968 ..	15	2·25	18	2·90	..	..	13	2.80	16	2.68	62	10.63	15.50	2.66
14	1969 ..	10	1·0	9	1·0	6	0·60	7	1.00	8	0.85	40	4.45	8.00	0.89

499 An age girth curve and age height curve were drawn based on the data collected. The data represent only a general average for the plantations now in existence without any distruction of site qualities.

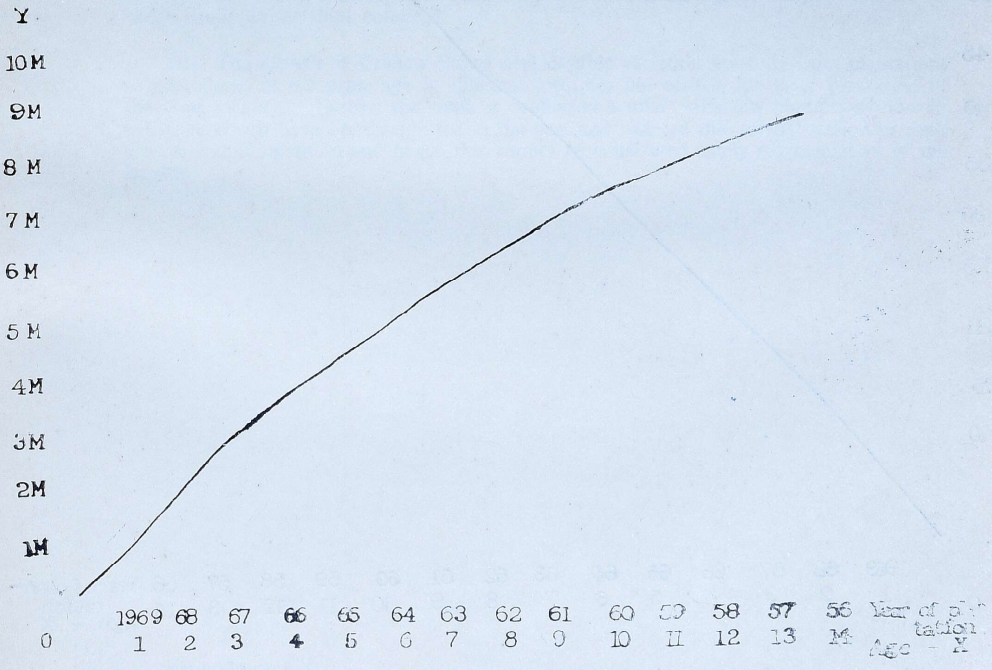
500. The site quality does not express itself quite early in the life of plantation, the destinction becoming quite a parent only after 10 to 15th year of the plantation.

501. The oldest plantation in Thanjavur division is first 15 years old and hence it is difficult to asctibe any comparision with the All-Ineia quality class since the performance of plantation in future is not known.

502. The present rate of growth indicate that most of the plantation will correspond to quality class IV of All-India quality.

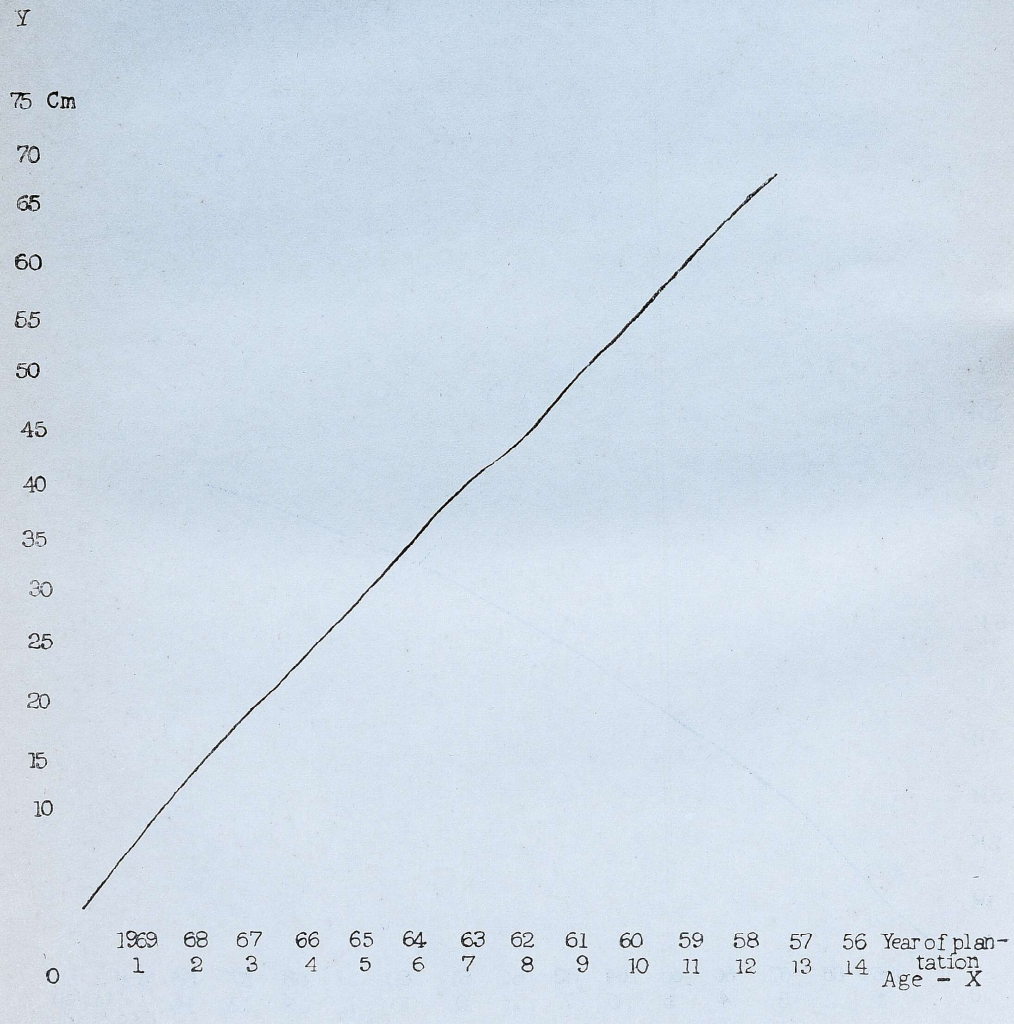
TEAK

Age - Height curve
OX - Age
OY - Height in metres



TEAK

Age girth curve
OX - Age
OY - Girth in cm.



Section-2.—Statistics relating to Cashew.

503. The crown width of cashew trees in various plantations of different age in all the localities was recorded by carrying out 10 per cent random enumerations and the results are tabulated below:—

Cashew.

Year of formation.	*Age in Years.*	*Crown width in metres.*	*Remarks*
1969	2	..	....
1968	3	1.02	....
1967	4	2.90	....
1966	5	2·34	....
1965	6	3.70	....
1964	7	3.65	....
1963	8	2.13	....
1962	9	4.06	....
1961	10	4.64	....
1960	11	3.50	....
1959	12	4.37	....
1958	13	3.50	....
1957	14	3.20	....
1956	15	4.70	....

A graph was drawn showing the relationship in between the age of Cashew and crown width based on the data collected.

504. The growth of Cashew shows considerable variation not only from plantations to plantations of the same age in different localities but also in the same plantation of the same locality. Further the data is collected o nthe very few plantations now in existence which have been neglected in the past and suffered due to suppression of rank growth and competition and hence this cannot be considered truely representative of the locality.

505. The yield of Cashew nuts from all the plantations of this division from 1964 to 1970 as obtained from the various statements in the control records is furnished below:—

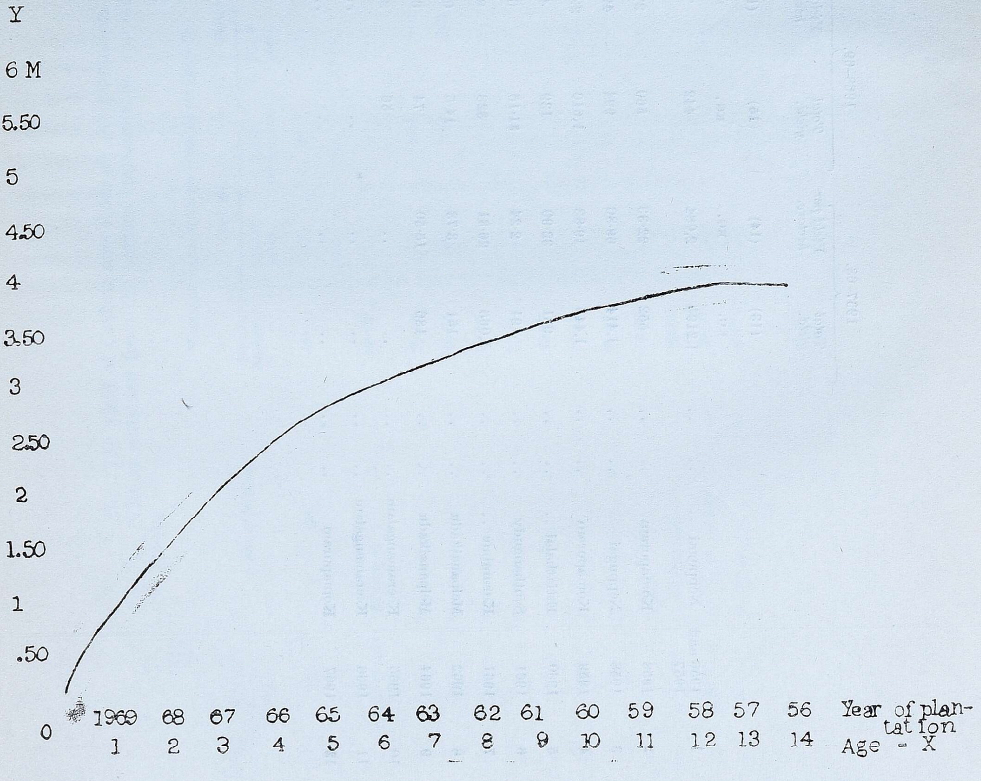
YIELD OF CASHEW FROM 1963–64 TO 1969–70.

Serial number.	Year of formation.	Name of locality.	Area in hectare.	1963–64.		1964–65.		1965–66.		1966–67.	
				Total yield.	Yield per hectare.	Total yield.	Yield per hectare.	Total yield.	Yield per hectare.	Total yield.	Yield per hectare.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
				KG.	KG.	KG.	KG.	KG.	KG.	KG.	KG.
1	1956 and 1957	Neppugai	60·72	..	..	..	..	..	..	..	..
2	1958	Komapuram	20·24	145	7·11	1,042	51·48	..	..	854	42·19
3	1959	Neppugai	20·24	45·45	2·24	260	12·84	604	29·84	706	34·88
4	1959	Komapuram	72·85	..	..	..	..	..	..	864	11·86
5	1960	Ettiathalai	32·38	..	..	..	..	..	..	..	..
6	1961	Senthangudy	40·47	..	..	..	..	..	..	..	..
7	1961	Kurumbur	40·47	..	..	..	..	..	..	..	..
8	1962	Melpanaikadu	40·47	..	..	..	..	..	..	30	0·74
9	1964	Melpanaikadu	12·00	..	..	..	..	..	..	..	..
10	1965	Keeramangalam	20·00	..	..	..	..	..	..	..	..
11	1966	Keeramangalam	20·00	..	..	..	..	..	..	..	..
12	1967	Komapuram	40·00	..	..	..	..	..	..	..	..

			1967–68.		1968–69.		1969–70.			
			Total yield.	*Yield per hectare.*	*Total yield.*	*Yield per hectare.*	*Total yield.*	*Yield per hectare.*	*Grand total yield per hectare.*	*Average yieldper hect are*
			(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
			KG.	KG.	KG.	KG.	KG.	KG.	KG.	KG.
1	1956 and 1957	Neppugai	1,219½	2,084	442	7·27	1,709½	28·15	56·26	18·75
2	1958	Komapuram	552	22·33	560	27·66	2,039½	100·76	251·53	41·92
3	1958	Neppugai	1,414	69·86	994	49·11	2,526	124·8	323·57	46·22
4	1959	Komapuram	1,445	19·83	1,616	22·18	2,875	39·46	93·33	23·33
5	1960	Ettiathalai	981	32·99	139	4·29	1,248	38·54	75·82	25·27
6	1961	Senthangudy	91	2·24	31·15	0·77	142	3·51	6·52	2·17
7	1961	Kurumbur	1,065	26·31	328	8·10	1,323	32·69	67·10	22·33
8	1962	Melpanaikadu	151	3·73	14·5	0·35	458	11·31	16·13	4·03
9	1964	Melpanaikadu	186	15·50	74	6·17	266	22·17	43·84	15·61
10	1965	Keeramangalam	..	..	56	2·80	531	26·55	29·15	14·67
11	1966	Keeramangalam	..	..	..	..	505	25·25	25·25	25·25
12	1967	Komapuram	..	..	..	..	1,077	26·60	26·60	26·60

CASHEW

Age - Crown width curve
OX - Age
OY - Crown width



506. The yield in Cashew depends upon a variety of factors such as soil, the genetic quality of the stock, seasonal rainfall, pest and disease, past treatment etc. In the past timely execution of various cultural operations such as soil working, cutting back the intervening jungle growth that were interfering and suppressing the Cashew, climber cutting and plant protection measures have not been carried out regularly which contribute great deal to the yield in Cashew. Further cashew responds very well to soil working, application of chemical fertilizer and pesticide etc., as per time schedule which have been started only from 1969 onwards. Cashew commences to yield from about 4th year and the yield increases progressively from 4th year and said to reach the maximum in 10th year and continues upto 25th year after which it falls down steadily provided all the necessary operations are carried out as per time schedule.

507. Thus it is evident the yield in Cashew varies considerably depending upon the age and the timely treatment given to it in addition to the inherent heriditary nature of the planting stock used. In the circumstances stated above it is too early to arrive at a definite conclusion regarding the yield in Cashew since most of the plantations are at the formitive stage.

SECTION 3. STATISTICS RELATING TO CASUARINA.

508. In order to ascertain the rate of growth of Casuarina plantations in Thanjavur forest division from the year of formation up to the age of clearfelling different plots each of 25 metres square in extent were selected at random in each plantation at different localities near sea coast and padugais and height and girth (over bark) measurements of all the trees in the plots were recorded. The average girth as well as the height per tree in all the plots for each age were calculated arithmetically and plotted on square paper. Mean curves were drawn separately showing the relationship between age and girth over bark age and height. The average measurements recorded in different age classes in padugai areas as well as areas near the sea coast are tabulated below:—

CASUARINA EQUISETFOLIA.

In Padugai areas:

Year of plantation. (1)	*Age in years.* (2)	*Girth over bark at breast height in cms.* (3)	*Height in metres.* (4)	*Remarks.* (5)
1970	1	..	0·70	..
1969	2	3·90	1·00	..
1968	3	8·10	3·10	..
1967	4	27·10	8·60	..
1966	5	27·60	8·80	..
1965	6	32·00	9·90	..
1964	7	38·00	13·50	..
Near sea coast				
1970	1	..	0·70	..
1969	2	4·00	1·00	..
1968	3	8·35	3·20	..
1967	4	24·40	4·70	..
1966	5	34·40	9·50	..
1965	6	35·20	9·80	..
1964	7	37·00	13·00	..

The above figures indicate that height growth and girth increment is better in padugai areas as compared to the areas near the sea coast.

509. Based on the data collected a graph was drawn showing the relationship between age and girth (over bark at breast height) curve and age, height curve which are shown in the opposite page.

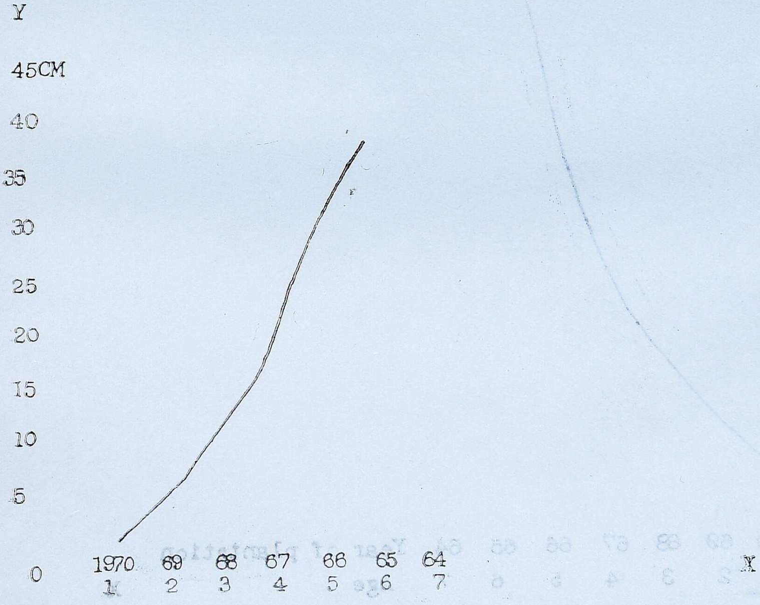
510. The yield from the various Casuarina plantations during the past 15 years from 1956 to 1970 obtained from the various statements from the control records are furnished in the following statement:—

Serial number and name of locality.	Casuarina.		Total yield in tons.	Yield in tons per hectare (average).
	Year.	Area in in hectare.		
(1)	(2)	(3)	(4)	(5)
1 Udayamarthandapuram	1956–57	10·31	104·00	10·09
2 Sodiakudy	1957–58	10·31	205·00	19·88
3 Do.	1957–58	4·65	152·00	32·69
4 Do.	1958–59	13·24	465·00	35·12
5 Mudalimadugu	1959–60	9·71	391·00	40·27
6 Sodiakudy	1959–60	10·92	206·00	18·86
7 Alakkudy	1959–60	2·42	60·00	24·79
8 Mudalaimadugu	1960–61	4·04	229.00	56·68
9 Sodiakudy	1960–61	4·84	190·00	39·26
10 Maharajapuram, Bit I	1961–62	13·20	283·00	21·44
11 Maharajapuram, Bit II	1961–62	4·16	101·00	24·28
12 Alakkudy	1961–62	13·48	113·00	8·38
13 Alakkudy	1962–63	7·68	381·00	49·61
14 Uadayamarthandapuram	1962–63	10·11	..	..
15 Udayamarthandampuram	1964–65	4·05	121·50	30·00
16 Sodiakudy	1964–65	14·16	285·25	20·14
17 Sodiakudy	1965–66	18.49	150.00	8·11
18 Mudalaimadugu	1966–67	12·95	247·50	19·11
19 Maharajapuram	1967–68	21·44	250·00	11·66
20 Pudupattinam	1967–68	4.45	51·00	11·46
21 Mudalimadugu	1967–68	16·33	400·00	24·49
22 Alakkudy	1967–68	6·07	59.00	9.72
23 Sodiakudy	1967–68	8·09	50·50	6.24
24 Udayamarthandapuram	1968–69	15·58	144·00	9·24
25 Kambaiyarmatham	1968–69	1·25	23·00	18·40
26 Koilady	1968–69	4·47	39·00	8·72
27 Maharajapuram	1968–69	18·55	121·00	6·52
28 Pudupattinam	1968–69	9·20	180·00	19·56
29 Kambaiyarmatham	1969–70	0·76	5·00	6·50
30 Pudupattinam	1969–70	8·36	74·25	9·00
31 Alakkudy	1969–70	8·90	Not available.	

NOTE: 1 Ton—1·06 Tonnes.

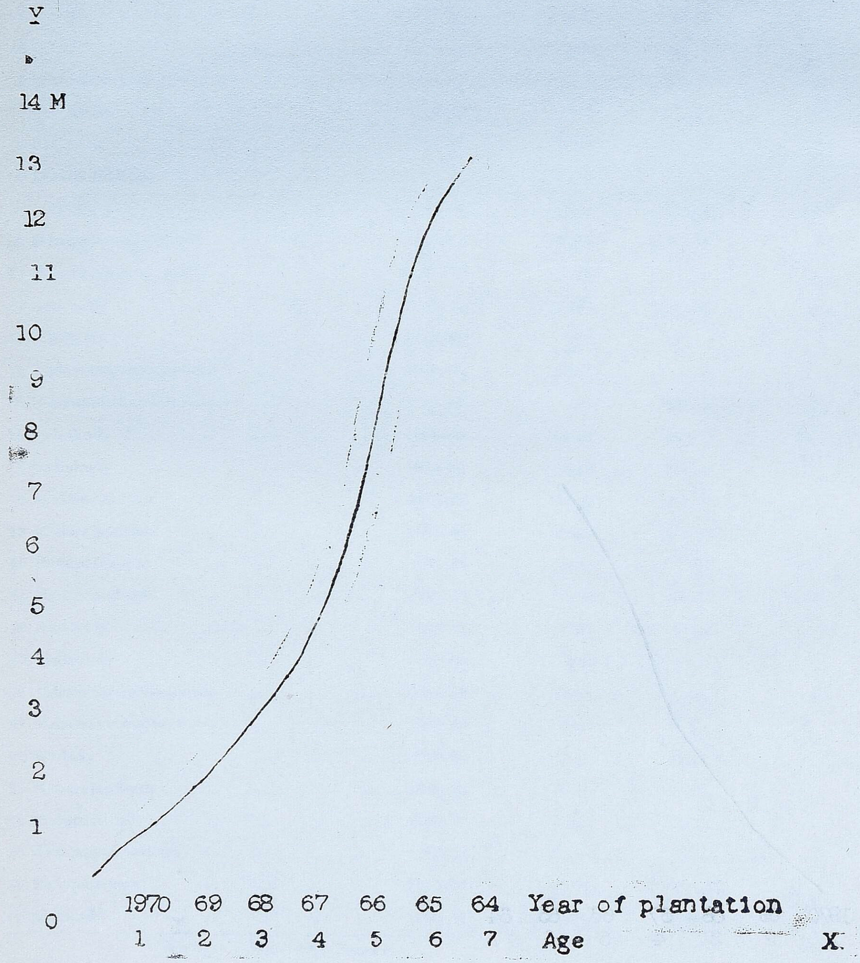
CASUARINA

Age girth curve
OX - Age
OY - girth in cms.



CASUARINA

Age height curve
OX - Age
OY - Height in metres.



SECTION—4—STATISTICS RELATING TO SISSOO.

511. Measurements of girth at breast height and height of *Dalbergia sissoo* in different localities in Thanjavur forest division were recorded by carrying out 20% random enumerations and the results are tabulated below:—

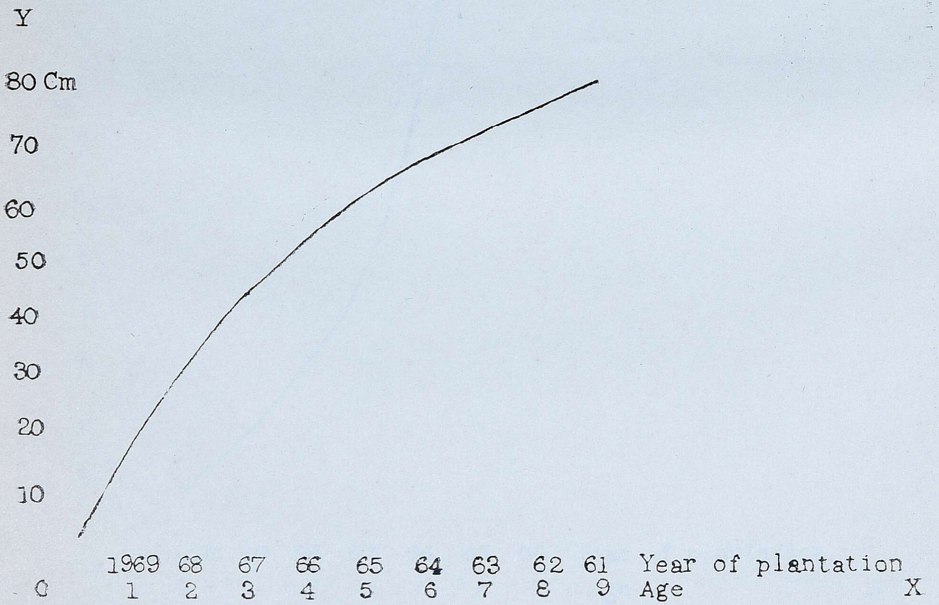
Serial number.	*Year of formation of plantation.*	*Age in Years.*	*Girth over bark at breast height in cms.*	*Height in metres.*	*Remarks.*
1	1969	2	20	2.0	....
2	1968	3	35	2.5	....
3	1967	4	44	3.0	....
4	1966	5	52	4.0	....
5	1965	6	60	5.0	....
6	1964	7	65	5.0	....
7	1963	8	70	5.5	....
8	1962	9	72	6.0	....
9	1961	10	80	7.0	....

512. Based on the data collected a graph was drawn showing the relationship between the age and girth over bark at breast height and another one for the age and height growth.

513. The data represents only a general average for the Sissoo plantation now in existence.

DALBERGIA SISSOO

Age - Girth curve
OX - Age
OY - Girth in cm.

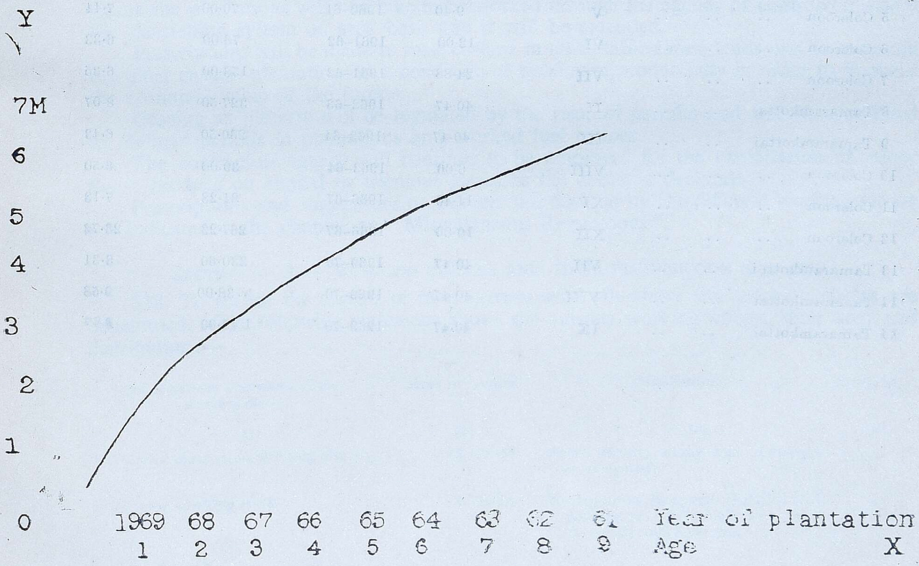


DALBERGIA SISSOO

Age height curve

OX - Age

OY - Height in metres



SECTION — 5 — STATISTICS RELATING TO MANGROVE FORESTS.

514. The mangrove forests have been worked by clearfelling after retaining all advance growth below 2 metres in height in the past and it was therefore considered worthwhile if it could be possible to study the rate of growth of the coppice shoots since the coppicing power of *Avicennia officinalis* (Alayanthy) which is the chief species of the mangroves was satisfactory. The existing coppice in the worked coupes lack homogeneity in growth owing to the varying rate of growth from place to place. Further mangrove type is characterised by its variability and irregularity, the nature of growth being dependent on the extent of inundation to which the area is subjected and successive deposition of alluvial silt. The task of accurately computing the rate of growth of the coppice shoots was therefore impossible and had to be left out. Further since mangrove vegetation keeps changing frequently and naturally due to tidal action and new accretions and as they cannot be perpetuated 'in situ' the necessity of working out the rate of growth of coppice regeneration is ruled out.

515. The yield from the various Mangrove areas during the past 12 years from 1959 to 1970 obtained from the various statements in the control records are furnished in the following statement:—

YIELD FROM MANGROVE.

Serial number and locality.	*Coupe number.*	*Extent in ha.*	*Year of felling.*	*Yield in tons.*	*Yield in tons per ha. (Average).*
(1)	(2)	(3)	(4)	(5)	(6)
1 Talainayar	V	9·6	1959–60	20·00	2·06
2 Coleroon	IV	1·1·6	1959–60	355·00	11·60
3 Tamaramkottai	I	53·82	1960–61	365·00	6·78
4 Talainayar	VI	23·24	1960–61	32·00	1·40
5 Coleroon	V	9·40	1960–61	70·00	7·44
6 Coleroon	VI	12·00	1961–62	76·00	6·33
7 Coleroon	VII	24·88	1961–62	158·00	6·35
8 Tamaramkottai	II	40·47	1962–63	327·50	8·07
9 Tamaramkottai	III	40·47	1963–64	260·50	6·43
10 Coleroon	VIII	6·00	1963–64	39·00	6·50
11 Coleroon	XI	11·40	1966–67	81·28	7·13
12 Coleroon	XII	10·00	1966–67	267·22	26·72
13 Tamaramkottai	VII	40·47	1969–70	330·60	8·31
14 Tamaramkottai	VIII	40·47	1969–70	38·00	9·58
15 Tamaramkottai	IX	40·47	1969–70	1 16·00	2·83

FUTURE MANAGEMENT DISCUSSED AND PRESCRIBED.

CHAPTER—I: BASIS OF PROPOSALS.

SECTION—1—GENERAL OBJECTS OF MANAGEMENT

516. The general objects of management of forests will be :—

1. To exploit the resources of the forests in respect of firewood and minor forest produce with due regard to sound silvicultural principles.

2. To rehabilitate the degraded ex-zamin forests by raising useful species to meet the demands of the local population at least partially.

3. To increase the commercial value of the forests by artificial regenration of economic species by augmenting and improving the quality of the growing stock wherever possible.

4. To afforest the coastal areas with casuarina plantations for the supply of firewood.

5. To afforest the river and canal fringes with teak and other commercially important species to meet the growing timber requirements of the population.

6. To protect and improve the forests in the interest of forest conservancy, water supply, soil conservation, agriculture, climate, flora and fauna.

7. To provide grazing facilities to the cattle consistent with the principles of conservancy.

4. To meet the demands of the established and prospective forest based industries for raw materials to the extent possible.

9. To protect the forests against damage by man, fire and other harmful factors.

10. To take all steps to maintain the forests in a state of increasing productivity for obtaining the maximum sustained financial return per hectare in perpetuity.

SECTION — 2 — METHODS OF TREATMENT TO BE ADOPTED.

517. The methods of treatment vary in each working circle which are described in detail under the respective working circles. The exploitation of firewood from the mangrove forests will be regulated by area. The silvicultural system will be clearfelling with natural regeneration.

Casuarina will be introduced only on suitable and ideal sites where it can grow well. Casuarina plantations will continue to be worked through the agency of contractors under the clearfelling system on area basis and it will be extended.

Prescriptions will be made to raise cashew in all suitable forest lands and to maintain the older cashew plantations in a condition of maximum productivity in order to improve the economic value of the forests.

Grazing as hitherto will be regulated by the issue of permits and will be prohibited for defined periods in plantations and worked fuel coupes.

The contractors agency will continue to be employed for the exploitation of minor forest produce on annual or triennial leases as the occasion demands.

Prescriptions and suggestions on matters not covered by the different working circles are indicated in the chapter on " Miscellaneous Regulations ".

SECTION — 3 — WORKING CIRCLES AND THEIR DISTRIBUTION AND AREA

518. To realise the objects of management set forth above five working circles are constituted. The following statement shows the various working circles, their area and distribution :—

Serial number and name of the working circle.	*Area in hectare.*	*Distribution.*	*Remarks.*
(1)	(2)	(3)	(4)
1 Timber plantation working circle	12,124·43	Areas mainly along the Cauvery river system.	..
2 Cashew working circle	1,374·24	Komapuram, Neppugai, Eittiathalai, Kurumbur, Melpanaikadu, Senthengudy and Avanam.	..

Serial number and name of the working circle. (1)	*Area in hectars.* (2)	*Distribution.* (3)	*Remarks.* (4)
3 Casuarina working circle	411·47	Pudupattinam, Alakkudy, Mudalaimadugu, Gopalasamudram, Maharajapuram, Mahadanapuram, Udayamarthaindapuram, etc.	..
4 Mangrove working circle	302·67	Muthupet and Thamaramkottai	..
5 Minor forests produce working circle.	Entire Thanjavur forest division.	Talainayar, Muthupet reserved forests, Manamelkundy, Chatram forests, Maharajapuram and cashew areas mentioned in Item No. 2.	..

519. Consequent on constituting these working circles the department will annually—

(1) Supply and provide 1,000 poles by way of thinnings in the timber plantation working circle.

(2) Exploit and market annually about 25 tonnes of cashewnut from the cashew working circle.

(3) Exploit and market 1,000 to 1,200 tonnes of casuarina fuel from the casuarina working circle.

(4) Sell and supply 250 to 300 tonnes of mangrove fuel to the brick kilns near Muthupet and Pattukottai.

(5) Supply 10,000 to 15,000 palmyrah leaves for thatching houses and provide fencing materials and 2.5 lakhs of coconuts from the minor forest produce working circle.

(6) Provide regulated grazing facilities to 6,000 heads of cattle under the miscellaneous regulations.

The chapter on Miscellaneous Regulations contains such prescriptions as are not found in the other working circles.

520. Manure leaf working circle prescribed by K. P. D. Rao's plan will be discontinued in the revised plan because there is no demand for removal of dry leaves from Kodiakadu reserved forests. Moreover it is not also silviculturally desirable since it is a harmful forestry practice leading to the progressive deterioration of the forests. Further Kodiakadu reserved forests was constituted in 1967 as Point Calimere Wild Life Sanctuary where no human activities are advisable from the point of view of preservation, promotion and conservancy of wild life.

521. Collection of minor forest produce from Kodiakadu reserve will be discontinued since interference by man is not desirable in the sanctuary. Further there is a general and gradual decline in the price fetched for the various minor forest produce units during the recent years, the average annual revenue realised by the sale of minor forest produce unit at Kodiakadu being Rs. 250 only. Hence minor forest prduce lease in Kodiakadu reserve alone is eliminated in this plan.

522. Detailed prescriptions are drawn up for the maintenance and improvement of the existing coconut plantations in Manamelkudy under the minor forest produce working circle.

Management of existing miscellaneous plantations and various prescriptions regarding grazing, etc., have been discussed under miscellaneous regulations.

SECTION—4—PERIOD OF THE WORKING PLAN.

523. This Working Plan will be in force for a period of 10 years from 1st April 1971 to 31st March 1981. However prescriptions are made regarding the areas to be worked in the succeeding five years so that work may be carried out according to this plan if there be any delay in the revision of this plan.

CHAPTER II—TIMBER PLANTATION WORKING CIRCLE.

SECTION 1—GENERAL CONSTITUTION AND OBJECT OF MANAGEMENT.

524. Timber plantation working circle is constituted with the object of growing teak and other timber species on a large scale along the banks of canals and rivers in order to augment timber production in the State and also to prevent soil erosion along canal and river banks.

525. *General constitution.*—This working circle includes all teak plantations so far raised along canal and river banks as well as areas proposed to be planted. The area of the working circle extends over Thanjavur and Tiruchirappalli districts all along the Cauvery river system and over a small part of South Arcot district. So far the effective area planted is 5,161.83 hectares since 1956 mainly with teak. Species like *Dalbergia sissoo*, *Ailanthus excelsa*, *Terminalia tomentosa*, etc. also have been raised over a small extent. A list of plantations raised upto 1970 in this division is furnished in Appendix XIII and XIV.

SECTION 2—DIVISION OF THE AREA.

526. The total area of the timber plantation working circle will be about 12,124.43 hectares out of which 5,295.17 hectares have been already planted with teak and other timber species and an area of 6,829.26 hectares will be available for future planting during the plan period.

The distribution of the area is as follows :—

Serial number and range.	*Existing plantations up to 1970 in hectares.*			*Area prescribed for planting 1971–85.*	*Total area in hectares.*
	Avenue.	*Compact.*	*Total.*		
(1)	(2)	(3)	(4)	(5)	(6)
1 Plantation Range, I, Thanjavur ..	1,055·44	57·49	1,112·93	1,313·90	2,626·83
2 Plantation Range II, Kumbakonam ..	1,056·63	50·18	1,106·81	1,063·50	2,170·31
3 Plantation Range III, Tiruchirappalli.	984·93	25·67	1,010·60	1,544·00	2,554·60
4 Plantation Range IV, Sirkali	1,074·92	..	1,074·92	1,243·00	2,317·92
5 Plantation Range V, Mannargudi ..	989·91	..	989·91	1,464·86	2,454·77
Total ..	5,161·83	233·34	5,295·17	6,829·26	12,124·43

The details of Avenue and compact plantations are furnished in Appendix XIII and XIV.

527. *Planting series.*—The working circle is divided into seven plantation series. Details regarding area and location of each planting series are given in the following statement. None of the plantations raised so far will attain the rotation age during the period of the plan. Hence no final felling of any plantations is comtemplated during the currency of this plan.

AREA OF EACH SERIES.

Serial number and range.	Name of the series.	Area in hectares. Already planted up to 1970.	Area in hectares. Proposed for future planting.	Remarks.
(1)	(2)	(3)	(4)	(5)
1 Plantation Range I ..	Thanjavur series	1,112·93	1,513·90	...
2 Plantation Range II.	Kumbakonam series ..	1,106·81	1,063·50	....
3 Plantation Range III.	Tiruchirappalli series ..	1,010·60	80·00	....
4 Plantation Range IV.	Sirkali series	1,074·92	1,243·00	....
5 Plantation Range V.	Mannargudi series ..	989·91	1,464·86	....
6 Plantation Range III.	Virudhachalam series ..	..	700·00	Plantation III Range after completion of planting in Tiruchirappalli district will move to Virudhachalam and after completing at Virudhachalam it will move to Chidambaram.
7 Plantation Range III	Chidambaram series ..	5,295·17	764·00	
	Grand total ..	12,124·43	6,829·26	

SECTION 3—ANALYSIS OF THE CROP.

528. The areas prescribed for planting with teak and other timber species are situated mostly in Thanjavur along the Cauvery system and a part of South Arcot district along the banks of Coleroon and Vellar rivers. The topography of the area is almost plain or gently sloping towards the sea. The future areas situated on the banks of the Cauvery and the Coleroon are small and scattered. Soil is mostly alluvium with general mixture of sand and varies from two to three metres in depth. Annual rainfall varies from 850 mm. to 1,400 mm. per annum. The main precipitation being between September to December.

SECTION 4—METHOD OF TREATMENT.

529. The silvicultural system to be adopted is clearing the growth on the banks of river and canal followed by concentrated artificial regeneration with teak. In areas unsuitable for teak other species will be planted.

Choice of species :

530. Teak will be the principal species to be grown since it is a very valuable timber which is in short supply especially in Tamil Nadu. The species is relatively easy to cultivate and comparatively fast grown for a timber species. Teak is also not prone to be browsed by cattle and recovers easily from damage-factors which render the species ideal for raising in localities which are in the immediate vicinity of human habitations.

531. The sites not suitable for teak either due to poor drainage, clayey and stiff soil, alkaline soil, etc., will be planted with other species like *Dalbergia sissoo*, *Ailanthus excelso*, *Salmalia malabarica*, *Terminalia arnuna*, *Terminalia tomentosa*, *Albizia lebbeck*, etc., *Dalbergia latifolia* may also be tried experimentally on a small scale and if the results are successful it will be worthwhile planting this species on a large scale as no systematic attempts are so far made to raise the species anywhere in the State whereas the natural stock is dwindling fast due to continued exploitation. In clayey and water logged areas *Terminalia tomentosa* will be planted. *Pterocarpus marsupium*, *Swietenia macrophylla* (mahaghony) may be tried on a small scale on suitable soils. Along the tail end of the canals nearer to sea coast where the soil is saline *Thespesia populones* and *Calophyllum inophyllum* will be preferable.

Rotation :

532. The tentative rotation adopted in the previous plan is 60 years which will be continued in this plan also in the absence of complete and reliable data. Moreover the age gradations available at present are for about 15 years only and the data obtained from these plantations would not give a correct indication of the increment trend for the entire rotation. However the growth habit of the principal species, namely Teak, in this region shows that this species does not attain the height that is generally observed in its natural moist deciduous habitat and there is also a tendency for greater branchiness.

Espacement :

533. Planting will be done in one or more rows along river margins and canal banks, depending on the extent of land available. The espacement prescribed for avenue plantations is 3.5 m. apart. In avenue plantations 1 km. length is reckoned as three hectares at the present spacing.

Annual planting :

534. Since the area available for further planting is 6829.26 hectares annually 500 hectares or 160 to 170 km. length will be taken up for planting. Every year five units of areas will be planted one in each range at the rate of 100 hectares or 30 to 35 km. length per range. Details of area to be planted yearwise in different localities are furnished in the statement given below. The annual area to be planted has been marked on the management map prepared and appended to this plan.

STATEMENT SHOWING TEAK PLANTATIONS (AVENUE) TO BE RAISED IN THANJAVUR FOREST DIVISION FROM 1971 TO 1985.

Serial number and name of the river.	*LB or RB*	*Avenue*		*Length in km.*	*Extent in ha.*	*Total extent in ha.*
		From.	*To.*			
(1)	(2)	(3)	(4)	(5)	(6)	(7)
		1971.				
1 Kattarkaduvaiyur	LB	87/7	88/5			100·70
	LB	89	92/0	5·80	17·55	
	RB	91/5	92/4	..	..	
2 Rathamangalam	Common	88/1	88/7	11·00	27·00	
3 Therkudiyur channel	LB	0/0	2/6			
4 Thoppalampuliyur channel ..	Common	0/0	3/0			
5 Devanadhi	LB	1/3	8/0	18·50	56·15	
	RB	0/0	5/0			
		1972.				
1 Vettar-Sittar	LB	3/3	9/4	21·35	64·65	101·50
	RB	1/0	9/4	..		
2 Vettar	LB	75/2	77/1	3·35	10·00	
	RB	75/2	76/1			
	RB	77/4	78/0	..		
	Common	82/4	85/0	8·80	26·85	
		1973.				
1 Konavaikal	Common	3/0	8/6	18·4	55·80	102·00
2 Mulkkanar	,,	0/4	3/0	3·50	10·90	
3 Valavaikal	,,	0/0	6/0	16·00	35·30	

Serial number and name of the river.	*LB or RB*	*Avenue.*		*Length in km.*	*Extent in ha.*	*Total extent in ha.*
		From.	*To.*			
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1974.						
1 Vellayar	Common	75/0	81/4	9.6	29·15	100·55
	LB	81/4	90/6	8·6	26·10	
	RB	90/6	92/4			
2 Annamarsanar	Common	0/0	5/0	15·00	45·30	
1975.						
1 Vennar	RB	73/0	75/0	10·85	32·75	109·10
	RB	76/0	80/6			
	Common	80/6	87/4	15·30	46·35	
2 Chandranadhi	LB	0/0	1/7	10·00	30·00	
	RB	0/0	3/7			
3 Vetty vaikal	LB	0/0	1/4			
	RB	0/0	3/0			
1976.						
1 Adiveera Ramanar	Common	73/0	76/3	8·30	25·10	92·60
2 Kondiyar	LB	0/0	3/2	18·40	55·35	
	LB	3/3	8/1			
	RB	0/0	3/2			
3 Palavanar	RB	0/6	3/2	3·85	11·65	
1977.						
1 Samunda Cauvery	LB	0/0	2/4	11·80	35·80	96·45
	LB	2/5	5/0			
	RB	0/0	2/4			
2 Najumanar	Common	1/1	3/3	7·20	21·85	
3 Haridwaramangalam channel ..	LB	0/7	3/2	6·40	19·40	
	LB	3/4	5/1			
	RB	0/7	3/2	6·40	19·40	
	RB	3/4	5/1			
1978.						
1 Ragunatha Cauvery	Common	4/5	9/6	6·80	20·65	103·35
2 Shullanar	LB	5/4	10/4	8·05	24·30	
	LB	10/4	18/0	12·05	36·40	
	RB	13/4	18/0	7·25	22·00	
1979.						
1 Vikramanar channel	Common	0/7	4/6	12·40	37·60	106·35
2 Puthur main channel	LB	0/50	3/50	19·2	56·60	
3 Vadavar RD	LB	5/85	7/30	4·00	12·15	
1980.						
1 Puthur channel	Common	2/1	4/5	8·00	24·30	101·30
2 Rajandram	,,	0/0	5/0	10·60	32·40	
3 Konakadungal	LB	8/3	12/6	6·90	20·95	
4 Pillavaikal	RB	0/0	4/7	7·30	23·65	
1981.						
1 Neivasal Tenpathi channel ..	Common	0/0	5/40	31·40	93·60	100·00
2 Vattacheri channel	RB	0/00	0/65	2·20	6.40	

Serial number and name of the river.	*LB or RB.*	*Avenue.* *Form.*	*Avenue.* *To.*	*Length in km.*	*Extent in ha.*	*Total extent in ha.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)
			1982.			
1 Vattacheri channel	RB	0/65	6/00	15·60	46·00	100·00
2 Vattacheri channel	LB	0/00	6/00	18·00	54·00	
			1983.			
1 Kulamangalam channel	Common	1/25	3/40	13·00	39·00	100·00
2 Paruthikottai	,,	0/00	2/40	14·60	42·70	
3 Arumulai Main	,,	0/00	1/00	6·00	18·30	
			1984.			
1 Arumulai main channel	RB	1/00	3/70	16·80	49·20	100·00
2 K.K. channel	LB	0/00	1/70	10·40	30·60	
3 Melavannaipattu channel	,,	0/00	1/00	6·20	20·20	
			1985.			
1 Melavannipattu channel	RB & LB	1/00	2/90	11·00	34·00	100·00
2 Kalyanadodai branch	,,	4/48	7/55	22·00	66·00	
					Total ..	1,513·90

Plantation Range No. II—Kumbakonam—

			1971.			
1 Manniar	RB & LB	46/0	56/4	33·6	101·98	101·98
			1972.			
1 Manniar	RB & LB	56/4	60/0	11·2	33·98	101·97
2 Moriar	,,	0/0	5/0	16·0	48·56	
3 Nandalur	,,	0/0	2/0	6·4	19·43	
			1973			
1 Nandalar	RB & LB ..	2/0	12/4	33·6	101·98	101·98
			1974			
1 Nandalar	LB ..	12/4	25/0	21·6	65·56	109·27
	RB ..	12/4	17/0	14·4	43·71	
		20/4	25/0			
			1975			
1 Keerthimannar	LB ..	65/0	75/4	16·8	50·99	92·27
2 Keerthimannar	RB ..	61/4	65/4	13·6	41·28	
		71/4	74/4			
			1976			
1 Poonavasal channel	RB & LB ..	0/0	10/0	32.0	97.13	97.13

Serial number and name of the river. (1)	LB or RB (2)	Avenue. From. (3)	Avenue. To. (4)	Length in km. (5)	Extent in ha. (6)	Total extent in ha. (7)
1977						
1 Puthar	LB	79/4	84/0	13·6	41·28	99·55
2 North Puthar	RB	84/ 0	88/0			
3 Puthar	RB	76/0	84/0	19·2	58·27	
4 North Puthar	RB	84/0	88/0			
1978						
1 South Puthar	RB & LB	84/0	90/0	19·2	58·27	116·54
2 Aliyanar	Do.	0/0	6/0	19·2	58·27	
1979						
1 Muttayar	RB & LB	0/0	6/4	20·8	63·13	111·69
2 Thenkoraiyur	Do.	0/0	5/0	16·0	48·56	
1980						
1 Tiruchangattangudi	LB	1/0	5/0	6·4	19·43	131·12
	RB	0/0	5/0	8·0	24·28	
2 Thirumalairajan	RB & LB	83/0	88/0	16·0	48·56	
3 Vada Koraiyar	Do.	0/0	4/0	12·8	38·85	
					Total	1063·50

PLANTATION RANGE NO. III TIRUCHIRAPPALLI.

1971						
1 Uyyagondon	LB	9/6	16/5	9·6	28·8	80·00
2 Uyyagondan	LB	20/0	25/0	8·0	24·0	
3 Kodingal canal	LB			8·0	27·2	
1972						
1 Main channel (High level channel).	RB & LB	0/0	11/0	34·00	102·00	102·00
1973						
1 Main channel (High level channel).	RB & LB	11/0	14/0	7·70	22·10	105·20
2 1st distributary of 5th	Do.	0/0	5/0	15·00	45.00	
3 5th distributory	Do.	0/0	4/0	12·70	38·10	
1974						
1 5th distributory	RB & LB	4/0	8/0	12·80	38·40	01·80
2 Palavanar drainage	Do.	0/0	5/0	15·00	45·00	
3 4th distributory	Do.	0/0	2/0	6·40	18·40	
1975						
1 Chinnathuvarai drainage	RB & LB	0/0	8/0	25·60	76·80	105.00
2 3rd distributary	Do.	0/0	3/0	9.60	28·20	

PLANTATION RANGE NO. III TIRUCHIRAPPALLI—*cont.*

Serial number and name of the river. (1)	*LB or RB* (2)	*Avenue.* *From.* (3)	*Avenue.* *To.* (4)	*Dength in km.* (5)	*Extent in ha.* (6)	*Total extent in ha.* (7)
1976						
1 North main channel	LB	1/0	4/0	6·40	18·60	93·60
2 Do.	RB	1/0	6/0	9·60	28.40	
3 South main channel	RB	0/0	2/0	3·20	9·60	
4 Do.	LB	0/0	4/0	6·40	18·60	
5 'B' Channel in Pelandurai Anicut system.	RB & LB	2/0	2/0	6·40	18·40	
1977						
1 Pelandurai main channel	RB & LB	0/0	10/0	32·00	96·00	96.00
1978						
1 'F' Channel in Pelandurai Anicut system.	RB & LB	0/0	4/0	12·80	38·40	96·40
2 Memathur main channel	LB	0/0	7/0	10·00	30·00	
3 Paravalur tank supply channel	RB	0/0	1/0	1·60	4·60	
4 Thoravalur tank supply channel	RB	0/0	1/0	1.60	4·60	
5 Kodukkar tank supply channel	RB	0/0	2/0	3·20	9·60	
6 Do.	LB	0/0	1/0	1.60	4·60	
7 Sethukudal tank supply channel	RB	0/0	1/0	1·60	4.60	
1979						
1 Alapakkam channel	RB & LB	0/0	1½	4·10	12·20	100·00
2 Andarmullipallam channel	Do.	0/0	1½	4.10	12·20	
3 Perumal tank bund	LB	0/0	7½	12.00	36·00	
4 Theerthanagiri channel	RB & LB	0/0	2/0	6.40	18·60	
5 Vellar Rajan channel	LB	0/0	4½	7.00	21·00	
1980						
1 Manambathan channel	RB & LB	0/0	9/0	28.80	86·40	105·60
2 Ariyakoshti channel	Do.	0/0	2/0	6·40	19·20	
1981						
1 Ariyakoshti channel	RB & LB	2/0	13/0	35·20	105·60	105·60
1982						
1 Veeranam tank bund	LB	0/0	12/0	18·00	54·00	111.40
2 Vadavar channel	RB & LB	0/0	6/0	19·00	57·40	
1983						
1 North Rajan vaikal	RB & LB	0/0	10/0	3·60	100·00	100·00
1984						
2 Thirunarai channel	RB & LB	0/0	6/0	20·00	60.00	108.00
1 North Rajan vaikal	Do.	10/0	15/0	16·00	48·00	

PLANTATION RANGE NO. III. TIRUCHIRAPPALLI—*cont.*

Serial number and name of the river. (1)	*LB or RB* (2)	*Avenue.* *From.* (3)	*To.* (4)	*Length in km.* (5)	*Extent in ha.* (6)	*Total extent in ha.* (7)
		1985				
1 North Rajan voikal	RB & LB ..	15/0	20/0	.. 16·00	48·00	133·40
2 Kavarapattu channel	Do. ..	0/0	8/0	28·60	85·40	
					Total ..	1,544·00

PLANTATION RANGE NO. IV. SIRKALI.

Serial number and name of the river. (1)	*LB or RB* (2)	*Avenue.* *From.* (3)	*To.* (4)	*Length in km.* (5)	*Extent in ha.* (6)	*Total extent in ha.* (7)
		1971				
1 South Rajan canal	RB & LB ..	76/7	88/4	36·60	109·50	109·50
		1972				
1 South Rajan canal	RB & LB ..	88/4	100/0	36·40	109·10	109·10
		1973				
1 Coleroon river	LB ..	68/0	88/4	33·60	101·98	101·98
		1974				
1 Coleroon river	LB ..	88/4	100/0	18·40	55·20	98·40
2 Pudumanniar	RB & LB ..	0/0	4/4	14·40	43·20	
		1975				
Puduma naiyar	RB& LB ..	4/4	15/0	33·60	101·98	101·98
		1976				
1 Pudumanniyar	RB&LB ..	15/0	26/0	35·20	105·60	105·60
		1977				
1 Poraivoikal	RB & LB ..	0/0	8/0	25·25	75·50	109·10
2 Uppanar	Do ..	0/0	3/4	11·20	33·60	
		1978				
1 Uppanar	RB & LB ..	3/4	7/0	11.20	33·60	110·40
2 Vikramanar	Do ..	0/0	8/0	25·60	76·80	
		1979				
1 Manjalar	RB & LB ..	80/7	91/4	34·00	103.00	103·00
		1980				
1 Manjalar	Common ..	91/4	93/0	4·80	14·40	101·94
2 Mahimalaiyar	Do. ..	86/7	94/0	23·00	68·34	
3 Veerasolan	Do. ..	88/0	90/0	6·40	19·20	
		1981				
1 Veerasolan	Common ..	78/0	88/0	32·00	96·00	96·00
		1982				
1 Veerasolan	Do. ..	68/0	78/0	32·00	96·00	96·00
					Total ..	1243·00

PLANTATION RANGE NO. V. MANNARGUDI.

Serial number and name of the river (1)	*LB or RB* (2)	*Avenue.* *From* (3)	*Avenue.* *To* (4)	*Length in Lm.* (5)	*Extent in ha.* (6)	*Total extent in ha.* (7)
		1971				
Adapar	Common	83/0	95/0	38·20	101.98	101·98
		1972				
1 Harichandra	Common	93/0	99/0	20·30	58·28	101·99
2 Valavanar	Do.	2/0	6/4	14·48	43·71	
		1973				
1 Vattacherry main channel	R.B.	0/0	2/0	12·87	38·85	101·99
2 Palayur main channel	Do.	0/0	3/50	23·10	63·14	
		1974				
1 Vettacherry main channel	Common	2/0	5/0	19·30	58·28	101·99
2 Korayar	Do.	84/00	88/4	14·48	43·71	
		1975				
1 Korayar	Common	88/4	93/0	14·48	43·71	101·99
2 Pamaniyar	Do.	80/0	86/0	20·30	58·28	
		1976				
1 Korayar	Common	94/0	97/0	14·48	43·71	101·99
2 Pamaniyar	Do.	87/0	89/0	9·65	29·14	
3 Vadavar No. I channel	Do.	0/0	1/50	9·65	29·14	
		1977				
1 Korayar	Common	97/4	99/0	4·82	14·56	101·98
2 Mulliyar	Do.	96/0	102/0	20·30	58·28	
3 Kannanar	Do.	0/0	3/0	9·65	29.14	
		1978				
1 Valavanar	Common	6/4	10/0	12·87	33·99	101·98
2 Kannanar	Do.	4/0	11/0	23·52	67·99	
		1979				
1 Agamalanar channel	Common	0/0	3/0	12·87	29·14	101·99
2 Kannanar	Do.	11/0	18/4	24·00	72·85	
		1980				
1 Kodivinayaganallur channel	Common	0/0	5/0	16·09	48·56	101·98
2 Koolayar	Do.	0/0	3/0	9·65	29·14	
3 Korayar	Do.	60/4	63/0	8·04	24.28	
		1981				
1 Kolyanaodai Branch Channel	Common	7/55	9/55	8·00	24·00	100·00
2 Do.	Do.	0/0	4/20	25·60	76·00	
		1982				
1 Kalyanaodai Branch channel	Common	4/20	6/25	19·00	57·00	100·00
2 Olavayai channel	Do.	0/00	2/50	14·60	43·00	

PLANTATION RANGE NO. V, MANNARGUDI—*cont.*

Serial number and name of the river.	*LB or RB*	*Avenue.*		*Length in Lm.*	*Extent in ha.*	*Total extent in ha.*
		From	*To*			
(1)	(2)	(3)	(4)	(5)	(6)	(7)
		1983				
1 **Olavayal Channel**	Common	2/50	3/00	3·40	10·00	100·00
2 **Rajamadam Branch channel**	Do.	3/00	8/00	30·00	90·00	
		1984				
1 **Rajamadam Branch channel**	Common	8/00	10/00	12·00	36·00	100·00
2 V. B. Channel	Do.	0/00	1/10	6·60	19·00	
3 T. K. Channel	Do.	0/00	2/50	15·00	45·00	
		1985				
1 T. K. Channel	Common	2/50	5/00	15·00	45·00	45·00
					Total	1,464·86

ABSTRACT.

Serial number and range.	*Localities selected.*	*Area in hectare.*
(1)	(2)	(3)
1 Plantation Range No. I	Thanjavur	1,513·90
2 Plantation Range No. II	Kumbakonam	1,063·50
3 Plantation Range No. III	Thiruchirappalli, Vridhachalam and Chidambaram.	1,544·00
4 Plantation Range No. IV	Sirkali	1,243·00
5 Plantation Range No. V	Mannargudi	1,464·86
	Total	**6,829·26**

ABSTRACT.

Serial number.	*Name of the viver.*	*LB or RB*	*Avenue.* From	*Avenue.* To	*Length in km.*	*Extent in hectare.*	*Total extent in hectare.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			1971				
1.	Kattarkaduvaiyar	LB	87/7	88/5			
		LB	89	52/0	5.80	17.55	
		RB	91/5	92/4			
2.	Rathamangalam (Common)		88/1	88/7			
3.	Therkudiyar channel	LB	0/0	2/6	11.00	27.00	100.70
4.	Thoppalampuliyur channel (Common) ..		0/0	9/0			
5.	Devanadhi	LB	1/3	8/0	18.50	56.15	
		RB	0/0	5/0			

Quality class :

535. The growth in the existing teak plantations at present indicates that the teak in Thanjavur division can be comparable to quality class IV of All-India quality. However, since the oldest plantation is only 15 years old it is too early to come to a definite conclusion.

Babul plantation :

536. In Chidambaram and Virudhachalam taluks suitable areas are available to the extent of 700 kms. along the banks of canals and tank and lake bunds for raising Babul. Babul besides being good fuel is used as small timber for various constructional purposes and agricultural implements. Further the twigs are used as fencing materials, the leaves and pods are greatly valued as fodder for cattle. This may be tried in these two taluks.

Collection of seeds :

537. Arrangements will be made with the State Silviculturist for the supply of teak and other seeds required.

The average weight of a bag of seed will be 25 kg. and about 1,800 seeds will weigh 1 Kg. Seeds can be stored in gunny bags upto one year. Normal germination is about 60 per cent and the plant percentage is about 55 per cent.

Nursery :

538. Standard nursery beds of 10 m. x 1 m. will be formed after digging the ground to a depth of about 30 cms. and breaking clods and removing all stumps, roots and stones. One-fourth cart of farmyard manure (250 Kg.) should be mixed well with the soil. Sides of the beds will be supported by pegs and brushwood or split bamboos. Paths of 0.5 m. width will be left in between two beds. The surface of the beds should be carefully levelled before sowing seeds. The beds will be raised to a height of 25 to 30 cms. to facilitate easy drainage.

539. One central nursery will be raised to supply the planting stock to the entire division which can be maintained well by a responsible subordinate who will look after the operations of the nursery. The cost of watering can be kept minimum by installing a 5 horse power pump to irrigate the nursery.

Sowing :

540. Eight to ten Kg. of teak seeds will be sown per bed in the middle of April without any pre-treatment and covered with soil to a depth equal to the thickness of the seed. The seeds will then be covered with straw. Watering should be done both in the morning and in the evening. Watering should be done carefully so that the straw is not washed into the soil. When germination is noticed the straw should be

removed. Watering will be continued except on rainy days till the seedlings are removed for preparation of stumps for planting. The beds should be kept clean weeded. About 2 beds will be sown with seeds of *Dalbergia latifolia* obtained from Pollachi or Nagercoil for planting along with teak on small scale. Seeds of *Salmalia malabarica* can be collected locally. *Dalbergia sissoo* will be raised by branch cuttings which can be obtained from the older trees within the division.

In the case of *Terminalia tomentosa* 10 Kg. of seeds will be sown per bed. For other species like *Dalbergia latifolia* and *Pterocarpus marsupium* one bag of seeds (about 200 litres) will be necessary for a standard bed.

No pre-treatment is necessary in the case of *Terminalia tomentosa. Salmalia malabaricum* etc. The pods of *Dalbergia latifolia* should be broken up before sowing. *Pterocarpus marsupium* will be soaked in cow dung solution for about 48 hours before sowing.

Shading should be given in the case of *Terminalia tomentosa* before and immediately after germination since the young seedling gets scorched under direct sun.

Size of nursery :

541. One standard bed is reckoned as sufficient for raising an avenue plantation to a length of 1.5 km. or 5 hectare including replacement of casualties.

Weeding :

542. The nursery beds will be kept clean weeded always and the soil loosened between the plants as and when necessary. It is essential to raise seedlings of uniform height right from the beginning which can be achieved by plucking off 'wolves' if any to prevent suppression of the rest.

Preparation of stumps :

543. One-year old teak stumps with a diameter range of 1.5 to 2 cms. thick at the collar give the best result. Two year old stumps can also be used provided they are within the specified size. The nursery beds should be watered well before the seedlings are pulled out. Removal should begin from one end of the bed and proceed systematically towards the other end. The plants should be removed one at a time by holding them as near the ground as possible and gently pulling out after loosening the soil by a pick axe as and when necessary. The larger plants should be taken out first and the smaller ones afterwards. The beds should be then remade, consolidated and watered and all under sized stumps put back at an espacement of 15 cms. by 15 cms. which will yield good stumps for replacement in the same year or for the following year.

544. It is essential to use a sharp knife in preparing stumps. All the small side roots should be trimmed off flush with the main root without damaging the bark and the stem cut off about 2 to 5 cms in a slanting manner above the collar and 24 to 27 cms of root portion should be left as per standard procedure. The top portion is slightly dipped in wax solution to prevent fungal attack or decay. *Dalbergia latifolia* can also be raised by stumps in the same manner.

SECTION 5—REGULATION OF REGENERATION OPERATIONS PREPARATION OF PLANTING SITE.

A. Survey and demarcation:

545. The areas to be planted in a particular year should be inspected one year in advance and the portions liable to be damaged by inundation or by flood should be marked out. Since planting has to be done depending up on the type of the soil, the extents of various types of soil should be noted in advance and the nursery planned accordingly. In areas where there is encroachment Public Works Department may be addressed sufficiently early to evict the encroachers so that the site is available for planting in time.

B. Clearing the area:

546. Clearing the area by cutting thorny bushes and other valueless growth if any will be done and completed by the end of May.

C. Aligning and staking:

547. Aligning and staking will be done during June and completed by the end of June by using stakes of 50 to 60 cms. length at an espacement of 3.5 by 3.5 m.

D. Planting:

548. Planting of teak stumps in crow bar holes in the centre of shallow depressions should be done during June–July when water is let into Cauvery system from Mettur reservoir. It is necessary to compact the soil around the stump so that no air space is last between the soil and the stump. Original planting should be done always on one definite side of the stake and rcplacements on the other.

549. Stump planting of other miscellaneous species like *Dalbergia letifolia, Dalbergia sissoo, Terminalia tomentose* and *Pterocarous marsupium* will be done at the same time as tea. Cuttings of *Thespesia populnea* and *Calophyllum inophyllum* of 1 to 1.5 m length with a girth of 15 to 25 cms. will be used for planting. In the case of species such as *Ailanthus exelsa, Salmalia malabarica, Terminalia arjuna, Alibizzia lebbeck*, etc., container seedlings raised in polythene bags which are 12 to 18 months old will be planted in pits of 30 cm. by 30 cm. 45 cm. deep. While planting, the polyhene cover will be removed. The container seedlings should be planted in the pit with ball of earth intact around the plants.

Watering:

550. Soon afterplanting watering will be done to each seedling on alternate days with one pot of water (10 litres) for the first twenty days from the date of planting in July and subsequently once in five days during the dry period till the outbreak of monsoon except on rainy days. Watering will be continued during the second year also once a week during the dry spell.

Replacement of casualties:

551. Casualities in the year of planting will be replaced as soon as noticed till the end of October. It is necessary to obtain full stocking in the first year itself. Individual casualties as well as extensive areas of failures should be replaced with teak during the second year also using large sized stumps only provided that the failure was not due to swampy conditions or bad choice of site. Casualties in the case of miscellaneous species should be replaced during the first two years with the same species.

Drainage:

552. It sometimes happens that teak and other plants get damped off in patches during the heavy and continuous monsoon rains which may lead to the decay of the stumps especially the newly planted ones. Hence it is necessary to drain off the water during the rainy season by the plot mazdoors. Frequent inspections by the subordinates are also essential during the rainy season.

Wells:

553. Wells, 8 m. diameter and 2 m. depth, will be dug during summer for watering the seedlings at the rate of 4 per km.

Section—6—Subsidiary silvicultural operations Tending—First year.

554. Two weedings along with soil working will be done during July-August and December-January. Weeding will consist of uprooting all grass, creepers and herbaceous plants to a radius of 60 cms. from the seedling. Climbers also should be uprooted as far as possible during the first two weedings. Soil will be worked to a depth of 10 to 15 cms. and to a radius of 60 cms. around each plant leaving 15 cms. from the seedling without damaging the same.

555. *Cutting back.*—Seedlings damaged by borers, wind and cattle or other causes should be promptly and neatly cut back at ground level as soon as the damage is noticed. Multiple shoots in any seedling should be reduced to one leader.

556. *Second year.*—During the second year 2 weedings along with soil working will be done as in the first year. Cutting back of coppice regrowth of useless species and uprootal of climbers and creepers will also be carried out along with weedings. Damaged plants will be cut back and multiple shoots be reduced to one leader. A general pruning or debudding over the entire plantation up to a height of 2 metres along with second weeding will also be done. The debudding will consist of removal of tender buds and branches which will come off by applying a little pressure with the hand without resorting to bill hook. The debudded or pruned portion will be applied with tar or soil to ward off fungal injection. The debudding should be done early without allowing the branches to grow woody. Special attention should be paid on this point since in the past pruning has been neglected in the early stages resulting in branchiness of teak in many of the plantations.

557. *Third year.*—During the third year pruning the side branches, climber cutting and cutting back the damaged seedlings flush with the ground will be done.

558. *Further maintenance of plantations.*—All the avenue plantations will be handed over to the Public Works Department at the end of three years for further protection and maintenance. However periodical thinnings and final felling will be undertaken by the Forest department.

559. *Thinnings.*—It is by thinning more than any other operation that the development of good teak bole is achieved. Since the site quality would not assert itself until the plantations are at least 10 to 15 years old, selective thinnings are prescribed only after this stage. Moreover the difference between the various plants would not be great until they reach this age and any selective thinning to remove a part of the growing stock would not reseult in a better thinning. Moreover plantations raised in linear strips as well as in compact blocks and so a thinning schedule suitable for the former may not be applicable to the latter. In addition there is often a mixture of species which makes it difficult to adopt a common schedule of thinning suitable for all of them. Hence different thinning schedule is prescribed for avenue and compact plantations.

560. *Thinning interval.*—The thinning cycle is so fixed that all thinnings are completed by the middle of the rotation age. It is consider that thinnings done beyond half the rotation age do not serve any purpose since teak and other timber species do not respond greatly as they get old. For the avenue plantations two thinning are prescribed, the first in the 12th year and the second in the 30th year. In the case of compact areas three thinnings will be carried out viz., at the age of 9th, 18th and 30th year.

The thinning schedule prescribed will be followed strictly unless the District Forest Officer considers postponement owing to the backwardness of any plantation or such other special circumstances subject to the approval of the Conservator of Forests.

561. *Thinning in Avenue plantations.*—The first mechanical thinning will be carried out by removing all the alternate plants in the row by which an espacement 7 metres apart (since the initial spacing is 3.5 metres apart) and reduction in the stocking by 50 per cent would result. The first thinning which is mechanical will be carried out by the Range Officer.

A second thinning will be carried out in the avenue plantations at the age of 30 years. During this thinning due regard will be paid to the retention better stems and more favoured species as far as possible.

562. *Marking rules.*—Marking for improvement fellings will be done by the District Forest Officer or his Gazetted Assistant. Every tree to be felled will be marked with the offiecer's personal hammer at a basal blaze so that the authority for its removal will be apparent even after the tree is exracted. Felling of marked trees should follow closely on the marking itself so that the marking officer can immediately see for himself the result of his marking.

563. The following guide lines are prescribed for carrying out thinnings:—

(*a*) Dead, dying and diseased trees will be marked.

(*b*) Unsound trees provided they are silviculturally available.

(*c*) Badly shaped trees provided their removal will benefit trees of better form and species.

(*d*) Thinning is congested groups of pole crop and advance growth.

(*e*) Cutting back of malformed shoots in order to get new shoots of better form. Complete over-head light is essential for the development of coppice shoots.

(*f*) Removal of inferior species which tend to obstruct the growth of more valuable species.

(*g*) Removal of less valuable stems in favour of more valuable stems of the same species.

564. The following operations will be carried out along with thinning:—

(1) Removal of lateral interference or sometimes even the over-head interference by lopping of side branches.

(2) Climber and creeper cutting, etc., should be done along with markings for fellings.

(3) Along with thinning, pruning of side branches will be carried out. Pruning should be confined to 1/3 to ½ of the total height of the tree. Special hand saws or pruning knives should be used for pruning the branches flush with the stem. Coaltar should be applied at the cut ends to ward off rot and fungal attack.

565. *Thinning programme.*—The following statement gives details of the areas to be thinned during the ten year period of this plan. Particulars of areas that will require thinning for subsequent 5 years are also given in case the revision of the Working Plan is not taken up in time.

STATEMENT SHOWING THE TEAK PLANTATION TO BE THINNED IN THANJAVUR FOREST DIVISION.

Year of plantation. (1)	*Locality.* (2)	*Year of thinning at 12th year.* (3)	*Area.* (4)
	Plantation Range No. I—Thanjavur.		
1961	Sholasudamaniar Sengalipuram canal Vettar Odambokiyar Common channel.	1973	63·13
1962	Sholasudamaniar Pandaviyar	1974	64·75
1963	Sholasudamaniar Sengalipuram drainage Petharasamar Common bank Pandaviyar	1975	64·75
1964	Velappar Vennar Vellayar.	1976	97·13
1965	Pandaviyar Velappar.	1977	64·75
1966	Odambokiyar Velappar	1978	80·94
1967	Velappar Sikkal Vettar Palayavalam channel	1979	82·56
1968	Vlappar Pandaviyar South Rajan Pitchakalayar Edayar.	1980	100·37
1969	Vettar Velappar	1981	80·94
1970	Vettar Kattar Kaduvaiyar.	1982	76·00
1971	Kattar Kaduvaiyar Radhamangalam Therkudiar channel Thoppalampuliyur Channel Devanadhi.	1983	100·70
1972	Vettar Vettar Sittar	1984	101·50
1973	Sulkkanar Valavoikal Konavaikal.	1985	102·00
		Total	1,079·52
	Plantation Range No. II—Kumbakonam.		
1961	Arasalar Thirumalairajan	1973	58·27
1962	Mudikondan Arasalar.	1974	64·75
1963	Kodamurutti Thirumalairajan Kodamurutti alias Puthar	1975	64·75

Year of plantation. (1)	*Locality.* (2)	*Year of thinning at 12th year.* (3)	*Area.* (4)
1964 ..	.. Arasalur Puthar.	1976	97·12
1965 ..	.. Puthar Noolar.	1977	77·70
1966 ..	.. Arasalar	1978	90·94
1967 ..	.. Mudikondan	1979	80·94
1968 ..	.. Thirumalairajan Nattar.	1980	105·22
1969 ..	.. Nattar Vanjiar Mudikondan Narumaniar.	1981	105·22
1970 ..	.. Vanjiar Noolar Nattar.	1982	80·94
1971 ..	.. Nanniar	1983	101·98
1972 ..	.. Nanniar Moriar Nandalar.	1984	101·97
1973 ..	.. Nandalar	1985	101·98
		Total ..	1,121·78

Plantation Range No. III—Tiruchirappalli.

1961 ..	.. New Kattalai High level channel.	1973	97·12
1962 ..	.. Do.	1974	66·37
1963 ..	.. New Kattalai High level channel	1975	64·76
1964 ..	.. Do. ..	1976	97·12
1965 ..	.. Cauvery	1977	30·76
1966 ..	.. Do. ..	1978	80·94
1967 ..	.. Do. ..	1979	71·22
1969	.. Coleroon	1981	48·56
1970 ..	.. Vyyakondan channel Coleroon	1982	90·00
1971 ..	.. Vyyakondan Kodigal channel.	1983	90·00
1972 ..	.. Main channel (High level channel) in Tholudur Anicut system.	1984	102·00
1973 ..	.. Main channel (High level channel) in Tholudur Anicut 1 distributary of 5th distributary 5th distributary	1985	105·20
		Total ..	934·05

Year of plantation.	*Locality.*	*Year of thinning at 12th year.*	*Area.*
(1)	(2)	(3)	(4)
	Plantation Range No. IV—Sirkali.		
1961	Cauvery Veerasholan Nattar.	1973	63·03
1962	Manniar	1974	64·75
1963	South Rajan Manniar.	1975	58·26
1964	Manniar Coleroon Right bank Kumki Manniar.	1976	97·10
1965	Manniar Ayyavaiyanar.	1977	64·75
1966	Manniar Ayyavaiyanar Cauvery.	1978	80·94
1967	Cauvery South Rajan canal Odayar.	1979	90·64
1968	Manjalar Mohimalayar.	1980	101·16
1969	Manjalar Mohimalayar.	1981	101·17
1970	Cauvery Vikramanar Ayyavaiyanar.	1982	59·88
1971	South Rajan canal	1983	109·50
1972	South Rajan canal	1984	109·10
1973	Coleroon river	1985	101.98
		Total	1,103·15

Plantation Range No. V. Mannargudi

1961	Paminiyar Korayar.	1973	64·75
1962	Paminiyar	1974	64·75
1963	Korayar	1975	64·75
1964	Paminiyar Korayar.	1976	97·13
1965	Adapar Mulliyar.	1977	64·75
1966	Ayyanar	1978	80·94
1967	Mulliyar Ayyanar.	1979	80·94
1968	Mulliyar Harichandra.	1980	100·37
1969	Korayar Harichandra. Ayyanar.	1981	140·03
1970	Harichandra Palavanar.	1982	102.00

Year of plantation. (1)	*Locality.* (2)	*Year of thinning at 12th year.* (3)	*Area.* (4)
1971	Adapar	1983	101·98
1972	Harichandra Valavanar.	1984	101·99
1973	Vattachery Main channel Palayar Main channel.	1985	101·99
		Total ..	1,166·37

ABSTRACT.

	(1)	*Area in hectares.* (2)
1	Plantation Range No. I, Thanjavur	1,079·52
2	Plantation Range No. II, Kumbakonam	1,121·78
3	Plantation Range No. III, Tiruchirappalli	934·05
4	Plantation Range No. IV, Sirkali	1,103·15
5	Plantation Range No. V, Mannargudi	1,166·37
	Grand Total	5,404·87

Thinning in compact plantations:

566. Three thinnings will be carried out at the age of 9th, 18th and 30th year in the case of compact plantations.

The first thinning at the age of 9 years will be mechanical thinning by which all plants in the alternate diagonal rows will be removed and consequently the number of plants will be reduced by 50 per cent. The resulting espacement after thinning will be 5 metres.

567. The second and third thinnings at the age of 19 and 30 years respectively will be selective thinnings. The following guide-lines are prescribed while marking for thinnings.

(*a*) Dead, dying and diseased trees in all canopy classes as well as suppressed trees will be marked for removal.

(*b*) Dominated trees with defective stems or crowns, whippy dominants as well as dominants with very defective stem and crown form will also be marked.

(*c*) Less promising trees in the dominent class may be marked. Some suppressed trees might be left as soil cover in the gaps created by the removal of the dominant trees.

Marking rules for thinnings:

568. 1. The first thinning which is mechanical will be carried out by the Range Officer.

2. Marking for the second and third thinnings which are silvicultural will be done by the District Forest Officer or his Gazetted Assistant. Every tree to be felled will be marked with his personal hammer at a basal blaze, so that the auhority for its removal will be apparent even after the exploitation of the tree. Extraction of marked trees should follow closely on the marking itself so that the marking officer can immediately see for himself the results of his marking and rectify if there is any mistake in marking.

(3) While marking, teak should receive preference but good stems of the secondary species like Rosewood (*Dalbergia latifolia*) Vengai (*Pterocarpus marsupium*) Karumaruthu (*Terminalia tomintosa*) should not be sacrified for a poorer stem of teak.

(4) Suppressed stems or saplings of miscellaneous species should also be cut when they interfere with teak.

(5) Trees right on the river or canal bank should be retained in order to prevent bank erosion.

(6) A climber cutting and removal of parasites on the trees should precede every thinning and the marking officer should ensure that these operations are carried out properly before he commences marking. The parasites should be effectively destroyed, preferably by burning.

(7) Marking of miscellaneous patches within the teak plantation should also be done along with teak adopting the same itensity of thinning.

(8) Irrespective of the grade of thinning all dead, dying and moribund stems should be marked for removal during the course of any silvicultural thinning. The intensity of thinning and the resultant espacement should vary with the age and condition of the crop as prescribed below:—

	Age at the time of thinning.	*Resultant especement.*	*Number of trees per ha.*	*Remarks.*
(1)	(2)	(3)	(4)	(5)
First thinning	9th year	5m X 5m	400	
Second thinning	18th year	7·8m X 7·8m	204	
Third and final thinning	30th year	11·8m X 11·8m	102	

(9) No removal should cause a lasting gap in the canopy.

(10) As there will be no thinning after the 30th year the stems to be retained at the final thinning will be the stems required for the final crop plus 10 per cent to allow for natural loss between the final thinning and the rotation age.

(11) Along with thinning pruning of the side branches to 1/3 height of the crown will be carried out as described in paragraph 564.

Thinning programme in Compact plantations:

569. During 1968–69 and 1969–70 first thinning along with pruning has been carried out in the following plantations and the same plantations can be inspected after 9 years and the suitability for second thinning or otherwise can be decided as the condition of the plantations warrant.

Serial number and name of range.	*Year of plantation.*	*Locality.*	*Area in hectares.*
(1)	(2)	(3)	(4)
	1968–69.		
1. No. I Range, Thanjavur	1956	Thenperambur compact ..	8·49
2. Do.	1957	Thenperambur compact ..	0·52
3. Do.	1957	Nagetty	0·37
4. Do.	1957	Nagetty	12·22
	1969–70.		
1. No. I Range, Thanjavur	1956	Thenperambur	8·49
2. Do.	1958	Vizhdhaiyur	2·93
3. Do.	1958	Rajendran	0·40
4. Do.	1960	Needamangalam	0·26

570. The following statement gives the details of the areas to be thinned during the 10 year period of this plan.

Tabular statement of II thinning to be carried out in Compact plantations in Thanjavur forest division.

Year of II thinning.	*Year of plantation.*	*Locality.*	*Area in hectares.*	*Total area to be thinned each year.*	*Remarks.*
(1)	(2)	(3)	(4)	(5)	(6)
Plantation Range, No. II, Kumbakonam.					
1977	1960	Sarukkai	2·83	6·45	
1977	1960	Kandiyur	1·84		
		Bit II .. .. Bit IV	1·78		
1978	1961	Enanallur I	0·44	..	
1978	1961	Enanallur II	0·61	..	
1978	1961	Enanallur III..	0·38	8·18	
1978	1961	Thandalam	1·21		
1978	1961	Nachiyarkoil I	0·40		
1978	1961	Nachiyarkoil II	0·28		
1978	1961	Villianvarambal	0·26		
1978	1961	Villianvarambal II	0·40		
1978	1961	Sombianvarambal I & II	1·70		
1978	1961	Krishnapuram	0·88		
1978	1961	Pathur, Mangudi, Koradachery	1·62		

The District Forest Officer may postpone the thinning in any plantation if it is not fit for thinning with the prior concurrence of the Conservator of Forests.

571. Third thinning will be due only after the expiry of the plan period. Hence the same is not contemplated in this plan.

Depots:

572. Depots for storage of thinned produce are necessary in different towns such as Mayuram, Thanjavur, Kumbakonam, Mannargudi, etc. The possibility of procuring suitable sites in different towns mentioned above may be explored since procurement of site is a difficult problem in Thanjavur district.

SECTION 7.—MISCELLANEOUS REGULATIONS.

573. *Reclamation of river and canal beds.*—Extensive areas of valuable lands along the river and canal banks are affected by floods periodically and steady bank erosion. The course of the river itself sometimes changed, engulfing new land while vast streches of the old river bed remain exposed.

The Public Works Department has under consideration a proposal to train the river courses so as to contain them to the minimum necessary width. If this work is undertaken, there is a possibility of getting considerable areas on either side of river banks for tree planting.

In Cauvery and Coleroon there is erosion of banks on one side and accretion of sand on the other side. Such riverain accretions may be reclaimed by planting suitable tree species like *Dalbergia sissoo, Casuarina equisetfolia, Pongamia pinnata, etc.*, provided the areas are not likely to be submerged in water and washed away by floods.

574. The species recommended for planting in different type of soil are furnished below:—

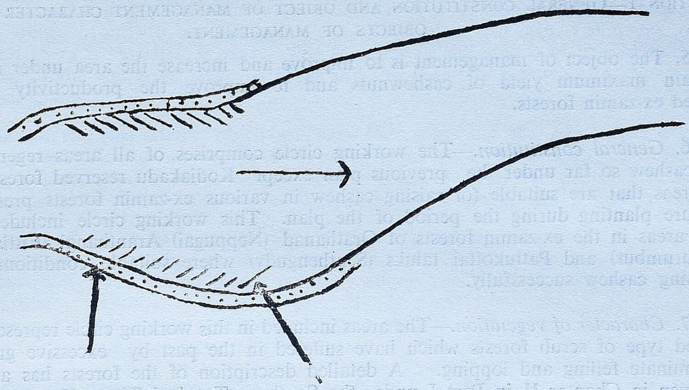
Type of Soil. (1)	*Species suggested.* (2)	*Remarks.* (3)
1. Coastal sand	*Casuarina equisetfolia Calophyllum inophyllum Thespesia populnea.*	
2. Marshy places	*Eucalyptus robusta Eucalyptus rudis Lagerstroemia flosreginae Barringtonia acutangula Salix alba.*	
3. Swamy areas	*Sapium sebiferum* *Arundodonax.*	
4. Semi water logged and saline soils	*Tamarix articulata.*	*Raised by branch. cuttings.*
5. Saline and swampy soils	*Butea frondosa.*	
6. Water logged areas	*Taxoedium distihcum.*	*Exotic timber. species.*
7. Semi water logged areas	*Sizygium cumini* *Trewia audiflora.*	
8. Fresh water swamps	*Diospyros embryopteries* *Pterospermum acerifolium* *Bischofia javanica* canes etc.	
9. *Kallar soil*	*Tamarix articulata.*	

575. The list will serve as a guidance only. It is left to the discretion of the District Forest Officer to select any of the species mentioned in the list whose performance and success is known in a particular type of soil. He can select and raise such other species also which have not been mentioned in the list but that are ideal and suitable for reclamation works depending upon the locality and soil factor.

576. *Prevention of bank erosion.*—The banks of Cauvery and Coleroon are eroded away and cut during the floods and rains resulting in loss of valuable land. Further bank erosion is caused frequently by the changing of the river course from its original position. The bank erosion by kollar river is severe near Bhuvanagiri en route to Sethiathope almost threatening the road. Hence the accessity to take up effective soil conservation measures to consolidate the Banks is of paramount importance. It is essential to ease the slopes of Banks in order to plant such species as arundodonax and other suitable grass species which are good soil binders.

To minimise soil erosion and cutting and eroding of banks, the river or stream has to be channelised and its width reduced to its natural dimensions. This can be achieved by deflecting the current by construction of stake and brushwood spurs inclined it as acute angle to the bank behind which the water deposits a part of its silt load. The spurs are further strengthened by planting cuttings of *Lannea grandis, Vitex negundo, delbergia sissoo, Ipomaea carnea* and Arundodonex.

577. ***River training by line hedge and spurs:***



Bunds may be stabilised by planting grasses such as Heteropogon contortus, Coachrus ciliaris, Cynodon dectylon Chrysopogton montanus, Trifolium minus, Pennisetum clandestinum, Sach harum spontaneum, etc.

578. *Plot mazdoors.*—One plot mazdoor (male) will be engaged for every 2 km. for protection and watering and for carrying out other cultural operations from July to March during the year of formation. He will be assisted by a female mazdoor from August to October and again from January to March. Replacement of casualties, etc., during the first year and in the second year will be done by the plot mazdoors. During the second year one plot mazdoor will be engaged from April to March who will be responsible for protection, watering, weeding and other cultural operations.

579. *Plantation boards.*—Every plantation should carry at the salient corners of its periphery conspicuous boards showing the Calender year of its formation, area and locality. These boards that require replacement will be renewed in the month of April every year.

580. *Inspection paths.*—Since the plantations are formed on the banks of rivers and canals there is no necessity for the formation of separate inspection paths.

581. *Closure to grazing.*—It is difficult to close the areas against grazing, especially avenue plantations. However, compact teak plantations will be protected from illicit grazing by constant vigil and inspection.

582. *Fire protection.*—Practically there is no fire in the division. Anyhow compact plantations will be kept clean of the inflammable materials.

SECTION 8—CONTROL.

583. *Control forms.*—Control forms, record of fellings and thinnings and record of regeneration operations, register of deviations, control maps are prescribed in appendix XX and XXI. A record of regeneration operations must be maintained for each plantation separately, which should give the details of operations carried out during each year, the expenditure incurred and the revenue realised, so that it may be possible to ascertain easily the financial position of the plantation at any stage.

584. *Other records.*—Nursery ledger and plantation journals will be maintained as prescribed.

CHAPTER III—CASHEW WORKING CIRCLE.

SECTION 1—GENERAL CONSTITUTION AND OBJECT OF MANAGEMENT CHARACTER OF OBJECTS OF MANAGEMENT.

585. The object of management is to improve and increase the area under cashew to obtain maximum yield of cashewnuts and to improve the productivity of the degraded ex-zamin forests.

586. *General constitution.*—The working circle comprises of all areas regenerated with cashew so far under the previous plan except Kodiakadu reserved forests and fresh areas that are suitable for raising cashew in various ex-zamin forests prescribed for future planting during the period of the plan. This working circle includes such of the areas in the ex-zamin forests of Orathanad (Neppugai) Aranthangi (Eittiathalai and Kurumbur) and Pattukottai taluks (Senthengudy) where suitable conditions exist for raising cashew successfully.

587. *Character of vegetation.*—The areas included in this working circle represent the degraded type of scrub forests which have suffered in the past by excessive grazing, indiscriminate felling and lopping. A detailed description of the forests has already been given in Chapter II in Part I under the Southern Tropical Thorn Forests and its degraded stages.

SECTION 2—DIVISION OF THE AREA.

588. The area of this working circle is 1,374.24 ha. out of which cashew has already been raised in 709.99 ha. up to 1970. An additional area of 664.25 ha. will be planted with cashew during the period of this Working Plan.

589. Particulars regarding the distribution of the area is given below:—

Serial number.	*Name of the Range.*	*Existing area in hectare.*	*Proposed area in hectare.*	*Total.*	*Remarks.*
1	Pattukottai Range	353 86	434 25	788 11	
2	Plantation Range I ..	356 13	220 00	586 13	
	Total ..	709 99	654 25	1374 24	

590. There will be three planting series as indicated below:—

Serial number.	*Name of the Range*	*Name of the series.*	*Name of the block*	*Area in hectare.*	*Remarks.*
1	Pattukottai	Aranthangi	1 I ttiathalai	51·25	
			2 Kurumbur	313·75	
2	”	Keeramangalam	3. Senthengudy	69·25	
			4. Keeramangalam (Bit I and Bit II)	..	
			5. Melapanikadu	..	
			6. Avanam	..	
3	Plantation Range I	Gandarvacottai	7. Komapuram	..	
			8. Neppugai	..	
			Total ..	443·25	

Each series will be divided into a number of annual regeneration areas with a 10 m. wide cleared line all around serving as baundary between two regeneration areas.

SECTION 3—ANALYSIS OF THE CROP.

591. The existing plantations were raised between 1958 and 1970. There is not only difference in growth between one plot and the other but also within one and the same plot there is variation in crop. The disparity in the crop may be ascribed to the difference in the soil from place to place and the inherent difference in vigour of the individual plants.

Some of the plantations which are over four years old the crop is so congested that they need thinning whereas in some other areas the same is open even after 6 or 8 years. At the same time there are gaps here and there in the plantations, ranging from one area to several areas as in Neppugai, Senthengudy which need restocking.

In some of the areas (Senthengudy, Kurumbur) the intervening jungle growth has not been cleared. In some of the places inspite of clearing, the jungle growth has reasserted itself. The jungle growth not only affects the proper development of cashew but also makes collection of usufructs difficult. In areas where the jungle growth has been removed under Kumri cultivation without adequate soil conservation there is run off resulting in mild sheet and fully erosions.

Hence the crop requires several intensive cultural operations such as restocking, thinning, clearing of intervening jungle growth, soil working, moisture and soil conservation measures, manuring, etc., in addition to plant protection measures.

592. The details of stocking in each plantation are furnished below :—

List of Cashew plantation raised in Thanjavur forest division.

Serial number and name of range. (1)	*Locality.* (2)	*Year and Compartment number.* (3)	*Extent in hectare.* (4)	*Spacing prceatage survials.* (5)
1 Planatation Range No. I, Thanjavur.	Neppugai ..	1956 I	20·24	16½′x6½′ 25
2 Do.	Do	1957 II	40·03	16½′x16½′ 32
3 Do.	Do.	1958 IV	20·24	16½′x16½′ 36
4 Do.	Do.	1974 III	40·87	16½′x16½′ work not completed.
5 Do.	Komapuram ..	1958 I	20·24	33′x16½′ 72
6 Do.	Do.	1959 III	72·85	33′x16½′ 45 per cent
7 Do.	Do.	1967 IV	40·47	16½′x16½′ 66
8 Do.	Do.	1969 V	40·47	16½′x16½′ 83
9 Do.	Do.	1970 II ABC.	60·72	16½′x16½′ 95
10 Pattukottai Range ..	Ettiathalai	1960 I	32·00	33′x16½′ 80
11 Do.	Kurumbur	1961 I	40·00	33′x16½′ 60
12 Do.	Melpanaikadu ..	1962 II	40·00	22′x22′ 65
13 Do.	Do.	1963 I	10·00	22′x22′ 50
14 Do.	Do.	1964 IV	12·00	22′x22′ 95

Serial number and name of range. (1)	Locality. (2)	Year and Compartment number. (3)	Extent in hectares. (4)	Spacing percentage survials. (5)
15 Pattukottai Range.	Melpanaikadu ..	1965 III A&B	20·00	22′x22′ 97
16 Do.	Do.	1966 V	20·00	16½′x16½′ 95
17 Do.	Do.	1967 VI	20·00	16½′x16½′ 92
18 Do.	Senthengudy	1961 I	40·00	33′x16½′ 29
19 Do.	Do.	1967 II	10·00	22′x22′ 92
20 Do.	Do.	1968 III	73·60	22′x22′ 95
21 Do.	Avanam	1969 I	36·26	16½′x16½′ 98
		Total ..	709·99	

SECTION 4—METHOD OF TREATMENT.

593. The treatment proposed aims at—

(1) Maintaining the existing cashew plantations and improving them by restocking the failed patches with cashew to meet the growing demand for cashewnut, (2) extending the area under cashew by planting fresh areas, (3) continuing the exploitation of cashew plantations by leasing out annually the right to collect the usufructs or by resorting to departmental collection in case there is no demand or the price realized in sales is not reasonable, (4) to increase the productivity of cashew plantations by carrying out suitable cultural operations such as thinning, soil conservation measures, restocking the gaps, manuring, climber cutting and soil working, clearing the intervening jungle growth, etc., and (5) protecting the plantations from pests and diseases by timely spraying of pesticides and chemicals.

594. *Choice of species.*—Cashew (*Anacardium occidentale*) will be raised as pure crop. It is not uncommon that several varieties of cashew exist. Since the object of management is to produce the maximum quantity of nuts, only the heavy yielding variety should be used. As the seeds of good yielders need not necessarily produce only heavy yielders, it is essential to select good yielders and propagate them vegetatively by air-layering.

595. *Silviculture of cashew.*—Though a horticultural tree, cashew is hardy and drought resistant. It thrives under a variety of social and climatic conditions but sandy soils are best suited to it. It grows on laterite soils on the west coast and does equally well on sandy soils of the east coast having a rainfall of only about 90 cms. Cashew is a waste land crop in Thanjavur district and it grows well on deep loamy soils with adequate soil aeration.

The crop is usually grown from seed and it can also be propagated by grafting and layering.

596. Cashew plants produce flowers on the twigs and branches of current season only. The factors which promote better growth of the crown are directly responsible for better yield. Out of the two growth flashes in the season, it is the earlier phase from October to January that gives rise to panicles while the latter flushes of March

to May are invariably unproductive. The hermaphrodite flowers occur only during the middle of the flowering season while they are staminate flowers at the beginning and at the end of the season. This accounts for the drying up of inflorescence during certain period of flowering due to the shedding of staminate flowers and this should not be mistaken for disease. During the peak production of hermaphrodite flowers (i.e., January to February) there is ordinarily neither wind nor rain. If a shower or two occurs at this time bumper yield is obtained. If there is heavy dew fall during this period the inflorescence is scorched resulting in poor yield. Similarly cloudy whether results in the shrivelling or drying up of the inflorescence.

The duration of ripening from the date of pollination varies from 45 to 70 days. When the apple is fully ripe the nut is mature for harvesting. Picking of nuts is done daily as all nuts do not ripen at the same time. March-April are the busiest and peak picking season.

As the yield of the tree depends on the production of hermaphrodite flowers and as the incidence of the production of the hermaphrodite flowers in the panicles is an inherent feature of the species and cannot be manipulated by cultural operations, the selection of proper high yielding mother trees is of prime importance. The distance between the anther and stigmatic end is also an important factor in obtaining better yields. Shorter style lengths and lower ratios of style length to stamen length are responsible for high yields. This factor is also an important one in the selection of mother trees.

The rainfall has got great influence on the yield, viz., (1) in years of low rainfall during the monsoon the yield tends to be subnormal, (2) lack of adequate rainfall results in the reduction of nut size, (3) rainfalls in March during the course of development of the fruit induces large nut size, (4) prolonged periods of cloudy or rainy weather during flowering season affects the yield, (5) heavy rains in October-November before flowering enhance the yield considerably, and (6) considering the above factors bumper yields can be expected once in three years.

597. *Silvicultural system.*—The silvicultural system will be clearfelling the natural forests followed by concentrated artificial regeneration. The regeneration will be by Kumri method as far as possible. If Kumridars are not forthcoming, the plantations will be raised departmentally.

598. *Rotation.*—The cashewtree commences fruiting by about the fourth year, attains the full bearing capacity by the tenth year, yields up to 40 years. The yield begins to fall after about 25 years. No definite data are available regarding the best rotation to be adopted under forest conditions. There is no precise data regarding the average yield at different ages of the crop and as cahew continue to yield up to about 40 years after which it dies natorally and as no plantation will be ripe for felling during the period of this Working Plan, the rotation is only tentatively fixed at 40 years.

599. *Espacement.*—Cashew has been raised at different espacement till 1970 as shown below :—

16½′x16½′ *Spacing.*

Year.	*Locality.*
1956	Neppugai.
1957	Do.
1958	Do.
1970	Do.
1967	Komapuram.
1969	Do.

year.	*locality.*
1970	Komapuram.
1966	Melpanaikadu.
1967	Do.
1969	Avanam.
	22′x 22′ *Spacing.*
1962	Melpanaiakadu.
1963	Do.
1964	Do.
1965	Do.
1967	Senthengudy.
1968	Do.
	33′x16½ *Spacing.*
1958	Komapuram.
1957	Do.
1960	Ettiathalai.
1961	Kurumbur.
1961	Senthengudy.

600. Cashew has got a wide crown spread and as such 10 m × 10 m espacement is quite sufficient for a final crop. A closer spacement is advisable because of the following reasons :—

(*a*) Cashew starts yielding from about fourth year when their crowns are small.

(*b*) The crown do not close up before tenth to fifteenth years.

(*c*) The cost of initial formation is not high.

(*d*) Closer espacement will give better revenue in the early stages.

(*e*) Excess number of plants can be thinned out in due course when necessary and sold as fuel.

Hence it is prescribed that in areas to be planted with cashew during the period of this plan initial espacement of 7 m × 7 m will be adopted which also affords adequate space for inter cultivation by Kumridars.

601. *Regulation of yield.*—The yield will be regulated by area. The cashewnuts and fruits will be exploited annually through the agency of contractors or departmentally in unsold coupes. The unit of sale will be each year's regeneration areas in the case of regular plantations. It is left to the discretion of the District Forest Officer to include two or more plantations in a unit of sale, if necessary, as the occasion demands.

SECTION 5—TABULAR STATEMENT OF FELLING.

602. The distribution and the area of cashew plantations to be raised during each year of the Working Plan period are given below in the following statement. All the areas to be planted with cashew during the Working Plan period lie scattered mainly in Pattukottai and Plantation I Range.

Statement showing the areas proposed for raising of cashew plantations in Thanjavur forests range.

Serial number and name of Range.	*Locality.*	*Year of felling, Coupe number and area in hectares.*									*Total*
		1971.	1972.	1973.	1974.	1975.	1976.	1977.	1978.	1979.	
		Coupe number and area.	*Coupe number and area.*	*Coupe number and area.*	*Coupe number and area.*	*Coupe number and area.*	*Coupe number and area.*	*Coupe number and area.*	*Coupe number and area.*	*Coupe number and area.*	*area.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1 Pattukottai ..	Senthengudy ..	IV 37·57	V 31·68	..	..	..	..	..	..	..	69·25
2 Pattukottai ..	Ettiathalai ..	..	..	II 51·25	..	..	..	..	..	..	51·25
3 Pattukottai ..	Kurumbur ..	..	..	..	II 48·75	III 46·25	IV 50·00	V 50·00	VI 50·00	VII 68·75	313·75
4 Plantation Range No. I, Thanjavur.	Neppugai ..	VI 66·22	V 71·84	VII 44·67	VIII 47·27	..	..	..	..	..	230·00
	Total	103·79	103·52	95·92	96·02	46·25	50·00	50·00	50·00	68·75	664·25

SECTION 6—REGULATION OF PREPARATORY WORKS AND PLANTING.

603. *Regeneration.*—Cashew will be planted in the prescribed areas after completely clearfelling the natural growth, uprooting and ploughing. The regeneration will be done under Kumri as far as possible. If no Kumridars are forthcoming, the plantations will be raised departmentally.

604. *Survey and demarcation.*—The Working Plan map indicates the area included in this working circle and the annual regeneration areas in each planting series.

The site for regeneration during a particular year will be surveyed and demarcated on the ground by means of cut lines of 2 m width during the month of September–October in the previous year. The right for Kumri cultivation will be given during the planting year.

605. *Preparation of the regeneration area.*—The right to clearfell all standing jungle growth and to uproot the stumps will be sold in public auction during the month of November. The contractor will also burn the debris before vacating the area. In the case of coupes for which there is no demand from contractors either for clearfelling or for uprootal due to paucity of growth or for any other reasons the work will be executed departmentally.

606. *Lease period.*—Lease period will be from 1st January to 30th June for six months.

607. *Kumri areas.*—The lease units will be divided into bits of about 2 ha. each for the convenience of Kumridars. The right to do Kumri cultivation will be leased out in open auction during June and the Kumri lease commences from 1st July after the contractor vacates the area. Initially the lease period will be one year from July. The right to do Kumri cultivation in the area lease out to Kumridars for the first year may be renewed for a further period of 2 years, the lease being renewed annually, if the lessees have done the works satisfactorily as per the agreement conditions. The Kumridar is expected to clear all standing growth, burns the debris and uproot the stumps before sowing his crops. The area will be ploughed twice by the Kumridar after which aligning and staking will be done departmentally. The Kumridars are allowed to raise shallow rooted crop like Varagu, Groundnut, Gingelly, Samai, Thinai, etc. One row of Thuvarai in between the cashew lines may also be allowed. They will not be allowed to raise deep rooted crops such as Maize, Cholam and Castor which will cast shade on cashew.

Pits, 30^3 each, will be dug after weathering for some time the dug up earth will be refilled in the pits. Cashew seeds will be dibbled in the pits in August/September when some heavy showers are received and the soil as sufficiently soaked.

The Kumridars will do one weeding and soil working during December to a radius of 0.5 m. around the cashew plants. Casualities will be replaced then and there. In order to achieve full stocking casualities will be replaced during the second and third year of the lease period. The Kumridars will be also responsible for the successful upkeep of the plantations during the period of his occupation subject to close department supervision at every stage. Free Kumri may be given as an incentive to attract and encourage Kumri if there is lack of demand for the same in auction.

608. *Non-kumri areas.*—In the absence of Kumridars all regeneration operations will be done departmentally. Since a tractor has been provided in this division all the operations such as clearfelling the jungle growth, uprootal of stumps, levelling the site, formation of bunds, etc., will be done by the same. The operations carried out by tractor will be supplemented by manual labour as and when necessary.

During the year of planting tractor ploughing will be done thoroughly in the area during June. After ploughing, twice with tractor the area will be aligned and staked during July at an espacement of 7 m. x 7 m. Aligning is completed by the end of July.

609. *Pitting.*—Pits of 30 cm. x 30 cm. will be dug departmentally during July in the ploughed areas after aligning. Pitting will be completed by the end of July and the soil allowed to weather for sometime after which it is refilled just before dibbling.

610. *Dibbling.*—Before dibbling, the seeds will be immersed in water. All floating seeds will be rejected and only those which sink will be dibbled. The soil in the refilled pits will be scooped out and the seeds dibbled with the stalk end facing upwards in a slanting position at a depth of 5 to 7 cms. This is easily done by holding the seed with the stalk end upwards slanting between the thumb and index finger and pushing the seed into the soil. The best time for dibbling is the month of August, if there are rains by that time.

611. *Replacement of casualties.*—All casualties will be replaced by dibbling seeds during the first year itself as and when noticed. No replacement should be done after November by which time the monsoon generally weakens.

If there are more than one seedlings at a stake the most vigorous one will be retained pulling out the othera at the end of the monsoon season during the year of formation. During the second year casualty replacement will be continued.

Fencing with brushwood preferably with thorny species will be done around each plant to prevent damage from cattle and rodents.

SECTION —7—CULTURAL OPERATIONS.

612. Kumri will be encouraged wherever possible for a maximum period of three years which will keep down the growth of unwanted weeds. The soil working done to the agricultural crop also helps to promote the growth of cashew seedlings. At the end of third year the Kumrdiars vacate and handover the plantation to the department for further maintenance. In Kumri areas further management of the plantations is done departmentally from the 4th year onwards which consist of the following operations :—

(*a*) Periodical cultural operations such as climber cutting, clearing the intervening jungle growth, soil working, thinning, application of fertilizer, spraying of chemicals and pesticides to maintain the plantation in a state of maximum productivity.

(*b*) Soil conservation measures such as construction of contour bunds, waste weirs, etc., immediately after the vacation by the kumridars.

The following cultural operations are prescribed during different years:—

613. *First year.*—One weeding along with soil working by manual labour to a diameter of 1 m. around the plant to a depth of 15 cms. to 20 cms. will be done with pick axe during December leaving 10 cms. round the plant undisturbed to ensure safety of the plant and its root system. In addition to weeding and soil working climber cutting and cutting back the intervening growth will be done.

614. *Second year.*—The same operations as in the first year will be carried out.

If any of the plants are found to bear flowers during the second year, the flower stalks should be nipped off by hand during the weedings.

615. *Third year.*—Soil working to a depth of atleast 15 cms. and to a diameter of 1 m. around the plant may be done if necessary only to backward plants to boost up growth.

Thereafter cultural operations such as climber cutting, clearing the intervening growth, soil working, etc., will be carried out regularly once in 15 years in all the cashew plantations.

616. *Clearing of intervening jungle growth.*—Even after the original jungle growth is completely clearfelled while preparing the site for planting, it comes up again in the succeeding years and tends to suppress the cashew. Hence it is necessary to cut back or uproot the intervening jungle growth periodically atleast once in five years to promote the growth of cashew. This will be done either manually or by using tractors.

617. *Soil working.*—Intense soil working considerably improves the growth of cashew plants and also increases the yield. It ensures greater infiltration of precipitation and better aeration of soil. Though it will be ideal to work the soil every year it is not only costly but also not possible due to large areas tackled under cashew. However it is essential to work the soil atleast once in five years. Hence it is prescribed that soil working will be done departmentally in the fifth year and thereafter once in five years regularly. The soil should be worked to a depth of atleast 15 cms. to 20 cms. once in five years. All unwanted miscellaneous growth in the plantation will be clearfelled before taking up soil working. Since manual working will be costly and the country ploughs do not work the soil to sufficient depth, tractor will be preferred with advantage as the area to be covered in each range is fairly large. Tractor ploughing will be done once in five years in between the lines if there is space for the tractor to move. Otherwise soil working will be done by manual labour to a diameter of 3 m. around the plant to a depth of atleast 15 cms. by pick axes.

Kolinji will be sown in the alleys between cashew trees after each soil working to improve soil fertility, to keep down the weed growth and to act as a soil cover to prevent soil erosion. This can be ploughed back at each ploughing and sowings repeated. Kolinji although an annual it is of the nature of a self sown crop and if repeatedly sown for three or four seasons at most, the crop will establish itself every year with seeds shed into the soil. It is a leguminous crop and is an excellent green manure apart from its capacity to fix atmospheric nitrogen. The crop can be ploughed in situ by tractor once in five years and thus the soil enriched. If there is excessive growth in certain areas the Kolinji can be cut and removed for green manure purposes which will provide an additional revenue.

Soil working will be done between July and September before the onset of North-east monsoon. The sequence of areas to be taken up for soil working during each year of the plan period according to the prescriptions given above is furnished below. Further soil working for the succeeding five years is also given in case the revision of the plan is delayed:—

STATEMENT SHOWING THE PLANTATIONS TO BE SOIL WORKED IN CASHEW PLANTATION FROM 1971 TO 1985 IN THANJAVUR FOREST DIVISION.

Year of formation.	*Plantation Range No. I, Thanjavur.*		*Pattukottai Range Compartment No.*					*Year of soil working.*		
	Neppugai area in ha.	*Komapuram area in ha.*	*Ettiathalai area in ha.*	*Kurumbur area in ha.*	*Melpanaikadu area in ha.*	*Senthengudy area in ha.*	*Avanam area in ha.*	*I working.*	*II working.*	*III working.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1957	II 40·03	..	..	..	..	..	..	1971	1976	1981
1962	..	..	..	..	II 40·00	..	..			
1967	..	IV 40·47	..	..	VI 20·00	II 10·00	..			
1958	IV 20 24	I 20·24	..	..	..	..	..	1972	1977	1982
1963	..	..	..	..	I 10·00	..	..			
1968	..	..	..	..	..	III 73·60	..			
1959	..	III 72·85	..	..	..	..	..	1973	1978	1983
1964		..	..	..	IV 12·00	..	..			
1969	..	V 40·47	..	..	..	..	I 36·26			
1960	..	..	I 32·00	..	..	..	..	1974	1979	1984
1965	..	..	..	..	III *a* & b 20·00	..	..			
1970	III 40·87	II a b c 60·72	..	..	..	..	..			
1956	I 20·24	..	..	..	..	..	..	1975	1980	1985
1961		..	..	I 40·00	..	I 40·00	..			
1966	..	..	..	..	V 20·00	..	..			
1971	VI 66·22	..	..	..	..	IV 37·57	..			
1972	V 71·84	..	..	..	..	V 31·68	..	..	..	..
1973	VII 44·67	..	II 51·25	..	..	..	..	..	..	..

STATEMENT SHOWING THE PLANTATIONS TO BE SOIL WORKED IN CASHEW PLANTATION FROM 1971 TO 1985 IN THANJAVUR FOREST DIVISION.

Year of formation.	*Plantation Range No. I, Thanjavur.*		*Pattukottai Range Compartment No*					*Year of work ing.*		
	Neppugai Area in ha.	*Komapuram area in ha.*	*Ettiathalai area in ha.*	*Kurumbur area in ha.*	*Melpanaikadu area in ha.*	*Senthengudy area in ha.*	*Avanam area in ha.*	*I working.*	*II working.*	*III working.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1974	VIII 47·27	..	..	II 48·75	..	..	..	1978	1983	..
1975	..	..	..	III 46·25	..	..	..	1979	1984	..
1976	..	..	..	IV 50·00	..	..	..	1980	1985	..
1977	..	..	..	V 50·00	..	..	..	1981	..	
1978	..	..	..	VI 50·00	..	..	..	1982	..	..
1979	..	..	..	VII 68·75	..	..	..	1983	..	..
Total	351·38	234·75	83·25	353·75	122·00	192·85	36·26			

ABSTRACT.

		Area in hactares.
1 Plantation Range No. I, Thanjavur	..	586·13
2 Pattukottai	..	788·11
Grand Total	..	1,374·24

618. *Thinning.*—Cashew is a horticultural crop yielding fruits and nut which requires plenty of sunlight and aeration to produce maximum quantity of flowers, fruits and nuts. Since the initial espacement is 7 m. by 7 m. and cashew has got a wide spread, periodical thinning is necessary to relieve congestion. As the trees differ from one another significantly in vigour and yield only a selective thinning will be adopted aiming at the removal of less vigorous and less productive trees. The object of thinning will be to retain maximum number of good yielders and at the same time to remove congestion.

Thinning will be done only when trees in a plantation begin to overlap one another. Trees will be marked for thinning in March-April when they are in fruits. Factors to be considered at the time of thinnings are crown development, intensity of flowering and fruiting, general vigour of the tree, etc. The following rules are prescribed while marking the trees for thinning :—

(*a*) No trees will be marked where there is no congestion.

(*b*) If there are two good trees in a line with poor trees on either side both the good trees will be retained.

(*c*) Plants poor in health, vigour and yield will be marked for removal.

(*d*) When there are three or more trees of equal vigour and yield the alternate plants will be marked.

(*e*) To the extent possible good yielders will be retained in preference to the poor ones.

The first thinning will be done in the 9th year. It will be so regulated that not more than 25 per cent of the existing number of trees per ha. will be removed, and after the second thinning in the 14th year not less than 125 trees per ha. are left to form the final stand. It is presumed that the crop may not require any thinning beyond the 14th year.

In backward areas the initial growth may be poor and it may not be necessary to carry out more than one thinning sometimes between the 10th and 15th year. In plantations that have already been thinned once the response may not be up to expectations and the stcond thinning may have to be dispensed with.

The above prescription are with regard to normal plantations. As the plantations vary from one another in vigour and crown development the District Forest Officer will use his discretion in deciding the removals taking the prescriptions as a guidance.

Since the thinnings are to be done on a purely selective basis it is necessary that the marking should be checked thoroughly. The tsees should be marked for thinning with utmost care and caution by a Forest Officer not below the rank of Range Officer. The marked trees for thinning by the Range Officer should be inspected and approved by the District Forest Officer before actually carrying out the operations. While thinning trees will be cut and uprooted so that the stumps may not hinder soil working. Thinning will be done during June-July.

619. A tabular statement furnishing the year in which each plantation will be due for thinning during the Working Plan period is provided below. Thinning for the succeeding five years is also furnished in case the revision of the pian is not taktn up in tim..

STATEMENT SHOWING THE CASHEW PLANTATIONS REQUIRING I THINNING FROM 1971 TO 1985.

Name of range.	*Locality.*	*Year of formation.*	*Compartment No.*	*Area in ha.*	*Total.*	*Year of thinning.*	*Remarks.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Plantation Range	Komapuram	1958	I	20·24	20·24	1971	
No. 1	,,	1967	IV	40·47	40.47	1975	
				60·71			
Pattukottai Range	Melpanaikadu	1962	II	40·00	40·00	..	I thinning at the 9th year is not necessary.
	,,	1964	IV	12·00	12·00	1972	
	,,	1965	III A & B	20·00	20·00	1973	
	Senthengudy	1967	II	10·00	10·00	1975	
	,,	1968	III	73·60	73.60	1976	
				155·60			
			Grand Total ..	..	216·31		

ABSTRACT.

Plantation Range No. I, Thanjavur ..	60·71 ha.
Pattukottai Range ..	155·60 ha.
Total ..	216·31 ha.

STATEMENT SHOWING THE CASHEW PLANTATION IN WHICH I AND II THINNING TO BE DONE FROM 1971 to 1985.

Name of range.	*Locality.*	*Year of formation.*	*Compartment No.*	*Area ha.*	*Total.*	*Year of I thinning at 9th Year.*	*Year of II thinning at 14th Year.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Plantation Range No. I, Thanjavur.	Komapuram	1969	V	40·47	40·47	1977	1982
	,,	1970	II A,B&C	60·72	60·72	1978	1983
	Neppugai	1970	III	40·87	40·87	1978	1983
	,,	1971	VI	66·22	66·22	1979	1984
	,,	1972	V	71·84	71·84	1980	1985
	,,	1973	VII	44·67	44·67	1981	
	,,	1974	VIII	47·27	47·27	1982	
				372·06			

Name of range.	Locality.	Year of formation.	Compart ment No.	Area in ha.	Total	Year of thinning at I 9th	Year of thinning at II 14th
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Pattukottai Range ..	Melpanaikadu	1966	V	20·00	20·00	1974	1979
	,,	1967	VI	20·00	20·00	1975	1980
	Avanam	1969	I	36·26	36·26	1977	1982
	Senthangudy	1971	IV	37·57	37·57	1979	1984
	,,	1972	V	31·68	31·68	1980	1985
	Ettiathalai	1973	II	51·25	51·25	1981	
	Kurumbur	1974	II	48·75	48·75	1982	
	,,	1975	III	46·25	46·25	1983	
	,,	1976	IV	50·00	50·00	1984	
	,,	1977	V	50·00	50·00	1985	
	,,	1978	VI	50·00	50·00		
	,,	1979	VII	68·75	68·75		
				Total	510·51		

Abstract.

Plantation Range No. I, Thanjavur	372·06	ha.
Pattukottai Range	510·51	,,
Grand Total ..	882·57	ha.

620. *Older cashew plantations.*—Some of the older cashew plantations raised in Pattukottai Range are patchy and overgrown with rank jungle growth. Cultural operations such as clearing the intervening miscellaneous growth, climber cutting and intensive soil working around the plants as well as ploughing with tractor in between the lines if there is space available should be carried out in these plantations. Replacement of casualties should be done wherever necessary by dibbling cashew seeds in pits of 30 cm 3
where the gapis over 0.5 ha.

621. A list of such plantations is furnished below:—

STATEMENT SHOWING THE CASHEW PLANTATIONS WITH LARGE GAPS THAT REQUIRE RE-PLACEMENT OF CASULATIES AND THINNINGS.

Range.	*Locality.*	*Year of formation.*	*Compartment. No.*	*Area in ha.*	*Total.*	*Year of replacement of casualities.*	*Year of I thinnings at (9th year)*	*Year of II thinnings at 14th year)*	*Remarks.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Plantation Range No. I, Thanjavur	Neppugai ..	1956	I	20·24	20·24	1971	1979	1984	*
Do.	Do.	1957	II	40·03	40·03	1972	1980	1985	
Do.	Do.	1958	IV	20·24	20·24	1973	1981	..	
	Komapuram	1959	III	72·85	72·85	1974	1982	..	
				153·36					

*Replacemen of casualties will be done at 7mx7m.

Range.	Locality.	Year of formation.	Compartment number.	Area in ha.	Total.	Year of replacement of casualties.	Year of I thinning (9th	Year of II 14th year).	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Pattukottai Range ..	Kurumbur	..	1961	I	40·00	40·00	1971	1979	1984
	Ettiathalai	..	1960	I	32·00	32·00	1972	1980	1985
	Senthengudy	..	1961	I	40·00	40·00	1973	1981	..
	Melpanaikadu		1963	I	10·00	10·00	1974	1982	..
	Grand Total				122·00	275·36 ha.			

622. The following operations are suggested for maintaining the older plantations :—

(1) Cutting back and clearing the intervening growth and uprootal of hemeceylon stumps if necessary will be done once in five years.

(2) Intensive soil working around the plants to 3 metre square once in five years along with climber cutting.

(3) Replacement of casualties by dibbling cashew seeds in pits of (30) cm ^{3} if the gaps are large.

(4) If the inter space between the lines is large enough for a tractor to go through deep ploughing with tractor by attaching the disc will be done once in five years.

(5) Application of chemical fertilizer at the rate of 1/2 to 1 Kg. per plant every year.

(6) Plant protection measures such as spraying of pesticide will be done regularly every year during flowering, etc.

623. *Cost of formation.*—The approximate details of cost of formation per ha. is given in appendix XVIII.

624. *Climber cutting.*—Climbers like *Hemidesmis indica, Acacia intsia and Droscorea oppositifolia* come up profusely in all cashew areas and spreads themselves over the entire cashew affecting its growth as well as the yield. They should be cut and removed along with thinning.

625. *Filling up gaps.*—All gaps of 0.5 ha. or more will be replanted by dibbling cashew seeds at 7m. by 7m. Smaller gaps will be ignroed.

626. *Tending cycle.*—All the cultural operations will be combined and done in a single year as a single operations. A five year cycle is prescribed.

The following schedule is suggested.—

Name of operation.	Season to be carried out.	Remarks.
(1)	(2)	(3)
1 Clearing jungle growth and climber cutting.	January to March.	..
2 Soil working	July to September.	--

SECTION 8—OTHER REGULATIONS.

627. *Method of exploitation.*—The right to collect the usufructs from the cashew plantations from the 4th year onwards will be sold annually in public auction during December-January. The lease period will be six months from 1st January to 30th June. The existing division of plantations into lease units based on the year of formation and location of the blocks will be normally continued. In the case of plantations having a large area, lease units will be fixed by dividing the plantations into smaller units, about 40 to 50 ha. forming a unit. The lessee shall be required to protect the crop during the lease period and shall keep the crop free of all climbers. The lessee will also be responsible for the upkeep of stones and trees which may serve as boundary features. All soil conservation works like bunds, etc., will also not be tampered with by the lessee.

In the case of unsold coupes, nuts will be collected departmentally.

628. *Plant protection measures.*—Cashew is susceptable to a variety of pests and diseases which affect the yield and the stand. Hence prophylactic and control measures have to be undertaken in the plantations regularly.

Though most of the pests and diseases are well known, the exact chemicals and methods used in the prevention and cure are not fully established and standardised. There has been no disease or pest in an epedemic form so far in this division. It will not be practicable to draw up a detailed programme of pest and disease control for each type of insect pest of fungal disease. The only method known are spraying or dusting the crop with chemicals. It is therefore suggested that each plantation may be sprayed with 5 per cent BHC and 1 %. Bordeaux mixturei once in October-November when the trees develop first foliage and again in December-January after flowering has set in. Twenty-five per cent parathion may be used as an alternative to 5 per cent BHC in the case of insect pests. The measures suggested above are of prophylactic nature drawn up on the basis of recommendations made by various specialists. The expert knowledge of Crop Protection Officers, Entomoligists and Mycologists may be made use of in deciding on the chemicals, season and method of spraying, as fresh knowledge is made available.

The execution of remedial measures in the departmental plantations alone is rendered ineffective by the spread of infection from the adjoining private plantations where such control measures are seldom undertaken. Since the Government and private plantations form continuous and compact blocks of large extents it would be useful to resort to aerial spraying in the entire tract at a reasonable costs. The private planters may be approached to pay proportinate costs; and if they are unwilling the cost may be initially borne by the Government and collected in instalments from the private owners. Otherwise protecting only the departmental plantations and leaving the adjoining private plantations unprotected will not be in the interests of the departmental plantations.

629. *Pesticide.*—Application of endrin should be done at the time when first flush of leaves appear. Second spraying with Fytolon and Endrin can be done when the crop is flowering.

A list of pests and diseases occurring on cashew and the various control measures suggested are given in detail in appendix XX.

630. *Manuring.*—Application of fertilizer is necessary to increase the productivity in cashew. Chemical manure will be preferred than inorganic ones. N.P.K. mixture of 9.9.9 ratio at the rate of half to one Kg. will be applied per plant and intimately mixed with soil. This application will be done before the end of November when there is optimum moisture in the soil so that the plant may utilise the manure which the available moisture in the soil. Fertilizer application will be done year after year regularly in the same area. Fertilizer will be applied in the trench formed around the plant during the process of soil working. During soil working a trench of 30 to 40 cms wide with a depth

of 5 to 8 cms. is formed at a distance of 1.5 m from the plant. Trench will be formed around the plants according to the crown width of the plant for application of fertilizers to facilitate the obsorbtion of the same by the root since there is close correlation between the root spread and crown width.

631. *Soil conservation.*—Soil conservation works such as contour bunds, check dams, gully plugs, construction of waste weirs, etc., will be done in cashew areas. Contour bunds will be formed as a part of preparatory work following tractor ploughing in non Kumri areas and the bunds will be consolidated by planting suitable species, such as Ipomea, Aloe, Agave, Datropha, Palmyrah, etc., during the year of formation itself. In Kumri areas soil conservation works may be taken up after Kumridars vacate the area.

632. *Inspection paths.*—Inspection paths 4m in width will be formed in between one plantation and the other, and also within the plantations at suitable intervals. The inspection paths should be formed at right angles to each other in such a manner as to traverse the entire plot. Inspection paths can be formed by tractor along with preparatory works before aligning and staking and they should be maintained in good repairs.

633. *Grazing.*—All cashew plantations will be closed to grazing for a period of five years including the year of formation.

634. *Fire protection.*—Fires are not common in this area. However the inspection paths in and around the plantations will be always kept clear of weeds and other growth.

635. *Fencing.*—As the cashew areas are lying within easy reach of the village cattle a thorny fence will be raised along periphery of the regeneration area with the forest crop during the year of formation. Along with the preparatory operations for the plot, a dead fence by heaping the brushwood obtained while clearing the area will also be erected and maintained till the live fence comes into existence. The peripherel bunds will be planted with suitable species like Agaeve will form a live fence subsequently.

639. *Plantation board.*—Plantation boards of 40 cm by 30 cm. will be put up at salient points indicating the year of formation, area in ha. and name of the locality.

637. *Resurvey of plots.*—Areas of some of the coupes in Senthengudy, Neppugai were found to be incorrect. Therefore a resurvey should be done in such coupes and the correct area should be computed. This work will have to be done as early as possible within the first or second year of the plan.

638. *Control.*—The control forms relating to this working circle are given in Appendices XX and XXI. They should be posted as soon as the operations are carried out and shall be commpleted at the closure of the financial year.

CHAPTER IV—CASUARINA WORKING CIRCLE.

SECTION 1—GENERAL CONSTITUTION, OBJECT OF MANAGEMENTS, ETC.

639. *General constitution.*—The working circle comprises of all the existing casuarina plantations as well as fresh areas proposed for planting during the period of the plan in order to supply firewood, to prevent erosion and to protect river banks.

Casuarina plantations have been raised over an area of 349.47 hectare between 1963 and 1970, and these are located in Plantation Range III (Tiruchirappalli) and Plantation Range IV (Sirkali), Pattukkottai Range, etc.

640. *Character of vegitation.*—Casuarina plantations are mostly confined to sandy places near the coast and padugais of the Cauvery. The soil is usually sandy, very coarse, porous and dry at the surface, poor in nitrogen and mineral nutrients. The water is usually brackish. Strong winds often salt laden, act as desicating agents and rendering conditions prenouncedly xerophytic. There is not only remarkable variation in growth between one plantation and the other but often within the same plantation. The vegetation falls under Littoral Forest type which has been discussed in detail in Chapter II of Part I.

641. A list of Casuarina plantations raised in this division up to 1970 is provided below:—

LAST OF CASUARINA PLANTATION IN THANJAVUR DIVISION

Serial number and name of Range.	*Locality.*	*Year of plantation.*	*Coupe Number.*	*Extent in ha.*	*Spacing and percentage of survicals.*	*Remarks.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 Pattukkottai Range	Udayamarthandapuram.	1963	I	10·00	8½′x8½′ 25 per cent.	No future area.
	Do.	1965	II	4·00	Do. 17 per cent.	
	Do.	1968	III	15·40	Do. 65 per cent.	
2 Plantation Range No. III, Tiruchirappalli.	Koilady	1963	..	1·60	..	Failure plot.
Do.	Do.	1969	..	5·60	..	Destroyed by villages for want of assignment of land.
	Mahadhanapuram ..	1969	I	40·47	95 per cent.	
	Do.	1970	II	8·00	90 per cent.	
3 Plantation Range No. IV, Sirkali.	Mudalaimadugu ..	1964	I	6·40	8½′x8½′ 85 percent	No future area.
	Do.	1966	II	12·70	8½lx8½l 85 per cent.	
	Do.	1968	II	16·80	8½′x8½′ 90 per cent.	
	Do.	1970	IV	12·10	8½′ 8½′ 80 per cent.	
	Alakkudy	1967	I	6·00	8½′ x8½′ 10 per cent.	
		1970	II	7·60	8½′x8½′ 80 per cent.	

Serial number and name of Range. (1)	*Locality.* (2)	*Year of planta tion.* (3)	*Coupe number.* (4)	*Extend in ha.* (5)	*Spacing and percentage of surviqials.* (6)	*Remarks.* (7)
3 Plantation Range No. IV, Sirkali—*cont.*						
	Sodiakudy	1964	I	6·00	8½'x8½' 40 percent.	33 hectares available for future planting.
	Do.	1965	II	29·20	8½'x8½' 50 per cent.	
	Do.	1956	IV	16·40	8½'x8½' 60 per cent.	
	Do.	1967	V	8·00	8½'x8½' 40 per cent.	
	Pudupattinam ..	1965	I	22·00	8½'x8½' 80 per cent.	
	Do.	1966	II	10·80	8½'x8½' 90 per cent.	
	Do.	1967	III	12·00	8½'x8½' 90 per cent.	
	Do.	1967	IV	4·00	8½'x8½' 90 per cent.	
	Do.	1967	IV	4·00	8½'x8½' 85 per cent.	
	Do.	1968	VI	16·40	8½'x8½' 40 per cent.	*Saline soil.*
	Do.	1968	VII	6·80	8½'x8½' 40 per cent	
	Do.	1969	VIII	9·50	8½'x8½' 90 per cent.	
	Do.	1970	IX	8·80	8½' 8½' 75 per cent.	
	Maharajapuram ..	1964	I	8·00	8½'x8½l 60 per cent.	
	Do.	1964	II	7·80	8½lx8½' 50 per cent.	
	Do.	1967	III	21·20	8½'x8½' 55 per cent.	
	Do.	1969	IV	14·00	8½'x8½' 75 per cent.	
	Do.	1969	V	4·50	8½'x8½' 75 per cent.	
				356·67		
Deduct failed and destroyed areas in Tiruchirappalli Range. ..				7·20		
			Balance	349·47		

Areas prescribed for fresh planting are located in plantation Ranges II to IV.

SECTION 2—DIVISION OF THE AREA.

642 The total area of the casuarina working circle is 411.47 hectare and are distributed as follows :—

Serial number and Range.	*Existing plantations in hactares.*	*Proposed plantations in hactares.*	*Total area.*	*Remarks.*
(1)	(2)	(3)	(4)	(5)
1 Plantation Range II (Kumbakonam).	Nil.	Nil.	..	..
2 Plantation Range III (Tiruchirappalli.)	48·47	Nil.	48·47	..
3 Plantation Range IV (Sirkali)..	271·60	33·00 hectares in Sodiakudy. 29·00 hectares in Gopalasamudram.	338·60 Stay order issue by Collector.*	..
4 Pattukkottai	29·40	..	29·40	..
Total ..	349·47	62·00	411·47	

*likely to be assigned to the public.

643. *Division into felling series.*—Irregular planting programme coupled with scattered nature of areas of the past renders it difficult to divide the area into felling series, each with complete age gradations and equi-productive annual coupes. The following felling series are proposed and as far as possible each felling series will be divided so as to obtain coupes of more or less equal extent in each series.

Two felling series are formed. The distribution, area and location of each felling series are given in the following statement :—

Range.	*Name of the series.*	*Area in hectares.*	*Name of the Blocks.*	*Area in hectares.*	*Remarks.*
(1)	(2)	(3)	(4)	(5)	(6)
Number IV Range (Sirkali)	Coleroon series.	.. ..	1 Alakkudy ..	13·60	278·10 hectares.
			2 Mudaliamadugu..	48·10	
			3 Sodiakudy ..	92·60	
			4 Gopalasamudram	29·00	
			5 Pudupattinam ..	94·80	
Number IV Range (Sirkali)	Cauvery series	.. ..	1 Maharajapuram	55·50	133·37 hectares.
Number III Range Tiruchrappalli	Do.		2 Mahadhanapuram	48·47	
Pattukottai	Do.	..	Udayamarthandapuram.	29·40	
			Grand Total ..	411·47	

SECTION 3—ANALYSIS OF THE CROP.

644. Casuarina plantation vary in stocking from place to place. The area planted in each year also varies. In the padugai of Cauvery and Coleroon rivers damage is caused by floods resulting in the washing away of casuarina seedlings along the river margins. Plantation sites differ from one another in fertility and there is great variation even within the same plantation due to soil factor.

SECTION 4—METHOD OF TREATMENT.

645. The silvicultural system will be clearfelling followed by artificial regeneration with casuarina.

Choice of species.—*Casuarina equisetifolia* will be raised as pure crop.

646. *Rotation.*—The principal object of raising casuarina plantations is fuelwood production. Hence the appropriate rotation for the plantations is the rotation of maximum volume production, which is the age at which the M.A.I. culminates. In the case of casuarina plantations in the division, it is observed that the M.A.I. reaches the maximum at 7 years. Hence a 7 year rotation will be adopted.

647. *Espacement.*—The existing espacement of $8\frac{1}{2}$ feet × $8\frac{1}{2}$ feet is the best suited for this species. Hence an espacement of 2.5 m. by 2.5 m which is the corresponding metric equivalent of $8\frac{1}{2}$ feet × $8\frac{1}{2}$ feet will be adopted.

648. *Size of annual plantations.*—The following table prescribes the annual planting areas in each series. The extremely scatered nature of blocks in each series and irregular planting programme in the past do not permit allotment of equal extents of compact blocks for annual planting.

STATEMENT OF CASUARINA PLANTATIONS TO BE RAISED IN THANJAVUR FOREST DIVISION FROM 1971 TO 1985.

Serial number and name of the ranye. (1)	*Name of the series.* (2)	*Locality.* (3)	*Year of formation.* (4)	*Coupe number.* (5)	*Area in hectares.* (6)	*Remarks.* (7)
1 Sirkali	Coleroon ..	Mudalaimadugu..	1971	I	6·40	
2 Do.	Do.	Sodiakudy ..	1971	I	6·00	
2 Do.	Cauvery	Maharajapuram	1971	I	8·00	
4 Do.	Do.	Do.	1971	II	7·80	
Pattukkottai ..	Do.	Udayamarthandapuram.	1971	I	10·00	Tree is likely to be felled during 1971–72.
6 Sirkali	Coleroon ..	Sodiakudy ..	1972	II	29·20	
7 Do.	Do.	Do.	1972	III	33·00	
8 Do.	Do.	Pudupattinam ..	1972	I	22·00	
9 Puttukkottai ..	Cauvery	Udayamarthandapuram.	1972	II	4·00	
0 Sirkali	Coleroon ..	Mudalaimadugu..	1973	II	12·80	
11 Do.	Do.	Sodiakudy ..	1973	IV	16·40	
12 Do.	Do.	Gopalasamudram	1973	I	29·00	
13 Do.	Do.	Pudupattinam ..	1973	II	10·80	
14 Do.	Do.	Alakkudy ..	1974	I	6.00	
15 Do.	Do.	Sodiakudy ..	1974	V	8.00	
16 Do.	Do.	Pudupattinam ..	1974	III	12.00	
17 Do.	Do.	Do.	1974	IV	4·00	
18 Do.	Do.	Do.	1974	V	4·40	
19 Do.	Cauvery	Maharajapuram	1974	III	21.20	

SECTION 6—TABULAR STATEMENT OF FELLING.

653. The following statement shows the plantations in each series to be clearfelled during the Working Plan period—

STATEMENT OF FELLING OF CASUARINA PLANTATIONS IN THANJAVUR FOREST DIVISION FROM 1971 TO 1985.

Year of formation.	*Name of series—Coupe number area in ha.*								Year of felling.
	Coleroon series.				*Cauvery series.*				
	Alakudy.	*Mudalaimadugu.*	*Sodiakudy.*	*Gopalasamudram.*	*Pudupattinam.*	*Maharajapuram.*	*Mahadanapuram.*	*Udayanarthandapuram.*	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1964	..	I 6·40	I 6·00	..	..	I 8·00 II 7·80	..	..	1971
1965	..	..	II 29·20	..	I 22·00	..	..	II 4·00	1972
1966	..	II 12·80	IV 16·40	..	II 10·80	..	..	..	1973
1967	I 6·00	..	V 8·00	..	III 12·00 IV 4·00 V 4·40	III 21·20	..	..	1974
1968	..	III 16·80	..	..	VI 16·40 VII 6·80	..	..	III 15·40	1975
1969	..	..	..	..	VIII 9·60	IV 14·00 V 4·50	I 40·47	..	1976
1970	II 7·60	IV 12·10	..	..	IX 8·80	..	II 8·00	..	1977
1971	..	I 6·40	I 6·00	..	..	I 8·00 II 7·80	..	I 10·00	1978

SECTION 6.—TABULAR STATEMENT OF FELLING.

653. The tollowing statement shows the plantations in each series to be clearfelled during the Working Plan period.

STATEMENT OF FELLING OF CASUARINA PIANTATIONS IN THANJAVUR FOREST DIVISION FROM 1971 TO 1985.

Year of formation.	*Name of series—Coupe number area inhectares.*								*Year of felling.*
	Coleroon series.				*Cauvery series.*				
	Alakdy.	*Madalaimadugu.*	*Sodiakudy.*	*Gopalasamudram.*	*Pudupattinam.*	*Mahrajapuram.*	*Mahadanapuram.*	*Udayamarthandapuram.*	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1972	..	..	II 20·20 III 33·00	..	I 22·00	..	..	II 4·00	1979
1973	..	II 12·80	IV 16·40	I 29·00	II 10·80	..	..	..	1980
1974	I 6·00	..	V 8·00	..	III 12·00 IV 4·00 V 4·40	III 21·20	..	..	1981
1975	..	III 16·80	..	..	VI 16·40 VII 6·80	..	..	III 15·40	1982
1976	..	..	..	..	VIII 9·60	IV 14·00	I 40·47	..	1983
1977	II 7·60	IV 12·10	..	..	IX 8·80	..	II 8·00	..	1984
1978	..	I 6·40	I 8·00	..	..	I 8·00 II 7·80	..	I 10·00	1985

Serial number and name of the range.	*Name of thi series.*	*Locality.*	*Year of forma-tion.*	*Coupe number.*	*Area in hectares.*	*Remarks.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)
20 Sirkali	Coleroon	Mudalaimadugu	1975	III	16·80	
21 Do.	Do.	Pudupattinam	1975	VI	16.40	
22 Do	Do.	Do.	1975	VII	6.80	
23 Pattukottai	Cauvery	Udayamarthandapuram.	1975	III	15·40	
24 Sirkali	Coleroon	Pudupattinam	1976	VII	9·60	
25 Do.	Cauvery	Maharajapuram	1976	IV	14·00	
26 Do.	Do.	Do.	1976	V	4·50	
27 Tiruchirappalli	Do.	Mahadhanapuram.	1976	I	40·47	
28 Sirkali	Coleroon	Alakkudy	1977	II	7·60	
29 Do.	Do.	Mudalaimadugu.	1977	IV	12·10	
30 Do.	Do.	Pudupattinam	1977	IX	8·80	
31 Tiruchirappalli	Cauvery	Mahadhanapuram.	1977	II	8·00	
32 Pattukottai	Do.	Udayamarthandapuram.	1978	I	10·00	
33 Sirkali	Do.	Maharajapuram.	1978	I	8·00	
34 Do.	Do.	Do.	1978	II	7·80	
35 Do.	Coleroon	Mudalaimadugu.	1978	I	6·40	
36 Do.	Do.	Sodiakudy	1978	I	6·00	
37 Do.	Do.	Do.	1979	II	29·20	
38 Do.	Do.	Do.	1979	III	33·00	
39 Do.	Do.	Pudupattinam	1979	I	22·00	
40 Pattukottai	Cauvery	Udayamarthandapuram.	1979	II	4·00	
41 Sirkali	Coleroon	Mudalaimadugu.	1980	II	12·80	
42 Do.	Do.	Sodiakudy	1980	IV	16·40	
43 Do.	Do.	Gopalasamudram	1980	I	29·00	
44 Do.	Do.	Pudupattinam	1980	II	10·80	
45 Do.	Do.	Alakkudy	1981	I	6·00	
46 Do.	Do.	Sodiakudy	1981	V	8·00	
47 Do.	Do.	Pudupattinam	1981	III	12·00	
48 Do.	Do.	Do.	1981	IV	4·00	
49 Do.	Do.	Do.	1981	V	4·40	
50 Do.	Cauvery	Maharajapuram.	1981	III	21·20	
51 Do.	Coleroon	Mudalaimadugu	1982	III	16·80	
52 Do.	Dn.	Pudupattinam	1982	VI	16·40	
53 Do.	Do.	Do.	1982	VII	6·80	
54 Pattukottai	Cauvery	Udayamarthandapuram.	1982	III	15·40	

Serial number and name of the range.	*Name of the series.*	*Locality.*	*Year of formation.*	*Coupe number.*	*Area in hectares.*	*Remarks.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)
55 Sirkali	Coleroon ..	Pudupattinam ..	1983	VII	9·60	
56 Do. ..	Cauvery	Maharajapuram.	1983	IV	14·00	
57 Do. ..	Do. ..	Do. ..	1983	V	4·50	
58 Tiruchirappalli ..	Do. ..	Mahadhanapuram.	1983	I	40·47	
59 Sirkali	Coleroon ..	Alakkudy ..	1984	II	7·60	
60 Do. ..	Do. ..	Mudalaimadugu.	1984	IV	12·10	
61 Do. ..	Do. ..	Pudupattinam ..	1984	IX	8·80	
62 Tiruchirappalli ..	Cauvery	Mahadhanapuram.	1984	II	8·00	
63 Sirkali	Coleroon ..	Mudalaimadugu.	1985	I	6·40	
64 Do. ..	Do. ..	Sodiakudy ..	1985	I	6·00	
65 Do. ..	Cauvery	Maharajapuram.	1985	I	8·00	
66 Do. ..	Do. ..	Do. ..	1985	II	7·80	
67 Pattukottai ..	Do. ..	Udayamarthandapuram.	1985	I	10·00	

SECTION 5. METHOD OF EXECUTING FELLINGS.

649. Exploitation will be done through the agency of contractors.

650. *Survey and demarcation.*—The areas proposed for clearfelling will be surveyed and demarcated on the ground in September of the year prior to that of felling. During survey the area will be divided into convenient bits to encourage more bidders to bid. The coupes will be sold in public auction during November. The bid shall be whole area of the plantation including the casuarina and other growth in the coupe.

651. *Lease period.*—The period of lease will be 6 months from December upto May according to the size of the coupe.

652. *Regulation of felling.*—Each coupe will be divided into 2 or 3 strips depending upon the number of instalments in which the sale amount is collected. Felling will be permitted in one strip at a time. Permission to take up work in the next strip can be granted after the work in the previous strip is fully satisfactorily completed and certified to this effect by the Range Officer after inspection. Moreover any kist amount due must be paid before permission is granted to enter the next strip. Uprooting of casuarina stumps will not be insisted upon. But the contractor must uproot the stumps of all the miscellaneous growth and other rank growth and thorny species occurring in the coupe to enable the department to replant the area again. The contractor will level the area to cover the extraction pits to facilitate regeneration work. The contractor may in addition uproot stumps of casuarina also even though this will not be insisted upon. The felled materials will be stacked in lots of 3m x 1m by 0.6m or its multiple for purpose of measuring the volume of wood. Roots and sullies should be stacked separately in stacks and bundles respectively. Each stack, poles and root swill be removed ony after the Range Officer has inspected and recorded the quantity of billets, poles and sullies extracted.

No charcoal burning will be allowed under any circumstances in the plantations or any part of the forest land. The mazdoors engaged by the contractor shall be supplied with cutter's chit authorising them to enter the leased area and to fell and collect the produce therein.

SECTION 7—REGULATION OF PREPARATORY WORKS AND PLANTING.

654. Each coupe will be regenerated artificially by planting in the same year following the felling as shown in the tabular statement.

655. *Preliminary works.*—All preliminary works will be started well ahead of the planting.

656. *Collection of seeds.*—Casuarina flowers and seeds twice in a year in May-June and again in December-January. As the seeds retain their viability only for a few months, it is not desirable to collect the seeds before sowing. Hence seeds should be collected from the cones ripening in June. Cones should be collected when they are ripe but before dehiscence from well grown mature trees of not less than 5 years in age. The ripe cones are brownish in colour. The cones should be collected in the afternoon and spread on the floor or on mats next morning and allowed to dry in the sun for 3 or 4 days. The cones should not be exposed to night or early morning dew. The cones dehisce liberating the seeds which are minute, 700 to 750 of them weighing a gram. The achenes which are liberated on the first two days alone are considered fertile. The seeds are dried in the sun for a further period of two or three days. As they are easily carried away by gusts of winds and ants great care should be taken to protect the seeds. The dried seeds should be stored in air-tight containers with ash or insecticide. One bag full of ripe cones will give about 0.5 Kg. of dried clean seeds. The germination percentage is 5 and they retain their viability for a few months only.

657. *Preparation of nursery.*—Great care and skill are necessary to raise a successful nursery. There is no need to locate nurseries near the planting sites since the naked casuarina seedlings can be transported to a long distance without damage. Hence it is recommended that a permanent central nursery for casuarina with good watering facilities will be sufficient to meet the required of the entire division. The nursery should be well fenced preferably with barbed wire, to prevent damage by cattle.

Standard beds of 10m long and 1m wide will be prepared. They will be raised to about 20 cms above the ground level. The sides should be supported with bundles of casuarina twigs. Paths of 60 cms width will be left between the beds. The soil should be dug to a depth of 50 cms. and well mixed with farmyard manure at the rate of 250 Kg. per bed (1/4 cart-load). The roots and unwanted materials, etc., will be removed from the bed.

Sowing of seeds mixed with sand and ash will be commenced early in the December and completed by the end of December or early in January. Eighty grams of seeds should be sown per bed lightly sprinkled with an insecticide. The seeds should be covered with thin layer of soil. The beds should be covered completely with casuarina twigs and needles or with paddy straw. Watering should be done both in the morning and evening with a fine rose can. Germination usually commences after a week and completed in about two weeks. When the germination is complete, the cover over the beds should be removed. Watering should be continued twice daily until the seedlings are removed for planting.

If any pests are noticed in the nursery an insecticide like folidal or dialdrin should be sprayed as and when necessary. During the early stages when the seedlings are 8 to 10 cms. in height they are pricked out. The seedlings to be removed should be carefully uprooted and pricked out in transplant beds of same size as the another beds (10m. by 1m.) at on spacement of 5 cms. square. If the seedlings are dense they grow lauky and unhealthy. Regular watering will be continued even after transplanting. The seedlings take about 5 to 6 months to reach the optimum size of 50 to 60 cms and by July the seedlings will be ready for planting. Allowing for the replacement of casualties damages and other factors abed should be sufficient to plant about 0.25 to 0.3 hectare about 3,400 seedlings will be required to plant one hectare including replacement of casualties at the rate of 2 seedlings per pit. Only seedlings with leading shoot intact should be planted

The beds should be watered profusely before removing the seedlings. The seedlings should be removed carefully by dismantling the bed without damaging the roots and they should be never pulled out violently.

It is worthwhile to consider the installation of a pumpset with a 5 H.P. engine to pump out water from the nearby river in a permanent nursery with necessay sprinkler set and hose pipe, etc.

658. *Preparatory works.*—Clearfelling should normally be completed by 31st May at the latest. Whatever debris is left behind by the contractor will be burnt. Fencing of the area against cattle is absolutely essential. Stray cattle are always at large in Alakkudy, Mudalaimadugu, Sodiakudy and Gopalasamudram and they are known to have caused sufficient damage to the casuarina plantations in the past.

659. *Aligning and staking.*—The entire area to be planted should be aligned and staked at an espacement of 2.5 m. by 2.5 m. Aligning and staking should be completed by the end of June.

660. *Pitting.*--Pits of 30 cm. by 30 cm. by 30 cm. will be dug and this work should be completed by the end of June.

661. *Planting.*—Planting will be done in June-July after the first showers of the south-west monsoon. Even if there are no showers the planting will be done by the end of July and the plants watered profusely. It is found that the late planting results in more casualties than early planting. It is not desirable to defer the planting to October-November as the ground becomes soaked with the water which is unsuitable for the establishment of the seedlings.

Planting stock consists of bare rooted nursery seedlings. Two seedlings will be planted 15 cms apart in each pit. The fine particles of sand adhering to the roots should not be shaken off but planted as such as they contain the valuable nitrogen fixing bacteria. Planting should be taken up by the first week of July and completed before the end of August. At the time of planting the soil in the pit should be puddled by pouring one pot of water. Care should be taken to see that the root system goes straight down without being bent or curved or otherwise damaged while planting. Where two seedlings have established in each pit, the less vigorous one should be removed.

662. *Watering.*—Watering is the most expensive item in the formation of casuarina plantations. The frequency and duration of watering depends upon the condition of the plantation and seasonal factors. Watering beyond the first two years is not only costly but does not help the plant very much. So watering will be restricted to a maximum of 150 to 160 days from the time of planting, only on non-rainy days, until the setting of south-west monsoon in the second year.

663. The following programme of watering the casuarina plantations is at present being followed in the division which will be continued :—

1. Half a pot of water per plant per day for the first 30 days from the date of planting.

2. 1/3 pot of water per plant on alternate days upto the end of December on all non-rainy days subject to a maximum of 90 watering days.

3. One pot of water per plant once in 5 days over 25 per cent of the area from January to June assuming that seedlings in 25 per cent of the area are backward, i.e., under the metre in height, subject to a maximum of 150 watering days.

Watering should be done before 11-00 a.m., in the morning and after 3-00 p.m. in the evening. Each female mazdoor can water about 300 seedlings in a day. It is suggested that iron pots of 10 litres capacity should be supplied to each mazdoor in the place of mud pots of varying sizes used at present and each pot full of water should be poured for 3 plants.

There is no need to modify the watering programme for the period following planting upto the end of December. From January to June the existing watering regime has often proved to be inadequate as is evident from the large scale mortality during the drought period. It is hence suggested that from January to June the watering schedule may be increased to 1 pot of water per plant once in 5 days over 40 to 50 per cent of the area subject to a maximum of 150 watering days. If due to any unusual climatic conditions there is need to increase the watering in any particular area or during any particular season the District Forest Officer may increase the watering regime with the prior approval of the Conservator of Forests.

664. *Wells.*—At present the practice is to dig one well for every 1½ acres of plantation. The size of the well is 6 to 7 m. diameter at the top and 3 to 3.5 m. at the bottom and with a depth of 3 to 3.5 m. The location of the wells should be so arranged that the lead to the farthest plants to be watered remains the same for all wells. Paths should be made on two sides of each well to facilitate the mazdoors easy access. The disadvantage with this well system is that the water level goes down in the dry season with the result that desilting becomes necessary. Much time and labour are spent in removing the silt and waiting for the re-appearance of water in the well. It is suggested that kerbing with casuarina brushwood to a diameter of 1 m. to a height of 1 m. may be provided at the centre of the pond to prevent silting of the pond. Old wells wherever present should be renovated and maintained.

Hand operated filter point pumps can be introduced on an experimental scale in casuarina plantations to supplement well irrigation. The depth attained by the tube of the pump will be as much as 8 m. so that water can always be made available even if the pump is operated continuously. The cost of a hand operated filter point pump will be about Rs. 250 including fixing charges and one mazdoor will be required to operate it. The pumps will not only be convenient to draw water without the botheration of maintaining a well in a sandy place but also can be easily taken out and shifted from one locality to another as and when necessary. The hand operated filter point pump is definitely advantageous in highly sandy areas where the water table is below 3.5 m. where the maintenance of the wells is costly.

665. *Replacement of casualties.*—Casualties will be replaced as and when they occur before the end of the rainy season in the first year. As the replacement in the second year do not generally catch up with the original plants, replacements should not be done in the second year.

However, due to certain unfavourable factors if casualties have occurred in large patches, they may be replaced in the second year provided the patches are more than 0.25 ha. in area, during June-July but not beyond this time. Every effort should be made to ensure full stocking during the first year itself.

As most of the plantations are adjoining the seashores or backwaters, the low lying portions are likely to be inundated with salt water at times. As the salt water is highly toxic to young casuarina seedlings such areas will not be planted up with casuarina seedlings and will be left as blanks and should be marked in the map if such areas are more than 0.5 ha. in area.

666. *Weeding.*—Since weeds are not a problem in the casuarina areas only one weeding will be done during October to a diameter of 1.5 m. around the plant in the first year of the plantation.

667. *Areas invested with prosopis and lantana.*—In certain localities such as Alakkudy, Mudalaimadugu, *Prosopis juliflora* has become a pest rendering it difficult to establish casuarina plantations. Despite repeated clearing it is difficult to eliminate this weed. They only way to keep this weed in check is to provide for its repeated uprootal during the initial 2 or 3 years of the plantation until the canopy closes. Special provision should be made for this work in the regeneration estimates, in areas badly affected with Prosopis.

Lantana camera invades the casuarina plantations at Sodiakudy and Gopalasamudram. Uprootal and burning, before fruiting, should be done systematically to eradicate the weed.

668. *Second year maintenance.*—During the second year the following operations are prescribed :—

1. If there is need to replace in large patches in the second year, the District Forest Officer may allow a replacement of casualties in June-July.

2. Watering backward plants (which are less than 1 m. in height) with one pot of water once in 5 days from April to the end of June upto a maximum of 75 days excluding the rainy days.

3. Maintenance of wells dug during the year of formation.

4. The fence will be strengthened with poles and thorns where cattle menace is rampant.

5. Soil working in the second year along with weeding to a radius of 75 cms around the plant to a depth of 15 cms. will be done during the month of August-September to the backward plants only where soil is compact.

669. *Pruning.*—The last Working Plan did not prescribe pruning in casuarina plantations due to the fear of exposure of plants to *Trichosporium nesiculosum* because of the wounds caused by pruning. However pruning is done at present in the 4th year without any serious risk from *Trichosporium nesiculasum* so far. There is a ready market for the pruned material which offsets the cost of carrying out this operation. The positive advantage of pruning is that it enables systematic enumeration of the stand in the 4th year so that the growing stock is accurately assessed and effectively protected. The current practice of carrying out an enumeration during the 4th year combined with pruning will therefore be continued.

The right to cut and remove pruned materials will be sold in public auction during July with a lease period of 3 months from the date of execution of agreement.

The contractor should work the coupe methodically starting the work at the farthest end and proceeding towards the nearest end. While pruning the contractor should adhere to the following rules :—

(1) Pruning of the branches will be carried out by the contractor at his expense in the presence of a Forest Officer not below the rank of a Forest Guard.

(2) Pruning should be done to a height of 2.5 m. from the ground level in the case of trees of and above 5 m. in height. Pruning of stems less than 5 m. in height should not exceed half the height of the plants. Plants below 2 m. in height should not be pruned.

(3) Sharp instrument should be used for pruning. The cut should be done as close as possible to the main stem without causing injury to the bark of the main stem. In no case should the stub of the pruned branch be more than 3 cms. in length.

(4) The cut materials should be bundled and removed by the contractor's mazdoors under cover of headload permits on the date of felling and the contractor is prohibited from transporting produce during night time.

(5) The Range Officer concerned will nominate a Forest Subordinate to supervise the work in a plantation and intimate the contractor. The contractor should give prior intimation to the Subordinate atleast one day in advance before he takes up pruning work.

(6) The contractor should not block up any creek, big or small, passing through the coupe or boundary of it.

(7) The contractor will be responsible for any damage to the trees inside the leased area and with a belt of 200 m. of the coupe.

STATEMENT SHOWING THE CASUARINA PLANTATIONS TO BE PRUNED IN THANJAVUR FOREST DIVISION FROM 1971—1986.

Year of formation.	*Name of series—Coupe number/area in hectares.*								Year of pruning.
	Coleroon series.				Cauvery series.				
	Alakudy.	Mudalaimadu.	Sodiakudy.	Gopalasamudram.	Pudupattinam.	Maharajapuram.	Mahadanapuram.	Udayamarthandapuram.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1968	..	III 16·80	..	..	VI 16·40 VII 6·80	..	..	III 15·40	1971
1969	..	..	..	..	VIII 9·60	IV 14·00 V 4·50	I 40·47	..	1972
1970	II 7·60	IV 12·10	..	..	IX 8·80	..	II 8·00	..	1973
1971	..	I 6·40	I 6·00	..	..	I 8·00 II 7·80	..	I 10·00	1974
1972	..	..	II 29·20 III 33·00	..	I 22·00	..	..	II 4·00	1975
1973	..	II 12·80	IV 16·40	I 29·00	II 10·80	..	..	..	1976
1974	I 6·00	..	V 8·00	..	III 12·00 IV 4·00 V 4·40	III 21·20	..	..	1977
1975	..	III 16·80	..	..	VI 16·40 VII 6·80	..	..	III 1·40	1978
1976	..	..	..	..	VIII 9·60	IV 14·00 V 4·50	I 40·47	..	1979

STATEMENT SHOWING THE CASUARINA PLANTATIONS TO BE PRUNED IN THANJAVUR FOREST DIVISION FROM 1971—1986—*cont.*

Year of formation	*Name of series—Coupe number/area in hectares.*								Year of pruning.
	Coleroon series.				*Cauvery series.*				
	Alakudy.	*Mudalaimadu.*	*Sodiakudy.*	*Gopalasamudram.*	*Pudupattinam.*	*Maharajapuram.*	*Mahadanapuram.*	*Udayamarthandapuram.*	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1977	II 7·60	IV 12·10	..	..	IX 8·80	..	II 8·00	..	1980
	..	I 6·40	I 6·00	..	..	I 8·00 II 7·80	..	I 10·00	1981
1979	..	..	II 29·20 III 33·00	..	I 22·00	..	..	II 4·00	1982
1980	..	II 12·80	IV 16·40	I 29·00	II 10·80	..	..	..	1983
1981	I 6·00	..	V 8·00	..	III 12·00 IV 4·00 V 4·40	III 21·20	..	..	1984
1982	..	III 16·80	..	..	VI 16·40 VII 6·80	..	..	III 15·40	1985
1983	..	..	..	..	VIII 9·60	IV 14·00 V 4·50	I 40·47	..	1986
1984	II 7·60	IV 12·10	..	..	IX 8·80	..	II 8·00	..	1987
1985	..	I 6·40	I 6·00	..	..	I 8·00 II 7·80	..	I 10·00	1988

Departmental working will be resorted to only when there is no demand in public auction. The cut materials will be collected and heaped and sold in public auction. The entire pruning will be done under the direct supervision of a Forester. It is anticipated that the revenue realised will cover the cost of departmental pruning.

670. *Removal of dead and wind fallen trees.*—All dead and wind fallen and damaged trees will be removed once a year and sold in public auction. Before removal they should be numbered serially and inspected by the District Forest Officer.

671. *Treatment of crop after first rotation.*—At the end of each rotation, after final felling, the area will be ploughed and sown with kolinji before planting casuarina in order to maintain soil fertility.

Other regulations:

672. *Grazing.*—The plantations will be closed to grazing for the first five years including the year of planting.

673. *Demarcation.*—Each plantation will be demarcated by plantation boards at the corners of the plantations indicating the year of formation, area and name of the block. Palmyrah will be raised on the boundary of each coupe at intervals of 2 m. and a clear space of 4 m. width will be left in between two coupes to serve as demarcation line and inspection paths.

674. *Enumeration and numbering.*—After completion of pruning the casuarina trees will be enumerated and numbered serially with thin iron plate of 5 cm. x 3 cm. by using suitable point which will be visible at all times and fixed on the trees by nailing.

675. *Protection.*—Illicit fellings are a problem in many casuarina plantations since most of the plantations are situated very near to the villages where there is great dearth and demand for fuel. The staff provided for the purpose of protecting these plantations is quite adequate. It is essential that a greater vigilance on the part of the protective staff and stricter control by their superiors is necessary to put down the illicit removal and theft in casuarina plantations. The present practice of appointing a plot watcher paid on monthly wages charged to the cost of the plantation for each plantation of up to 40 hectares or 2 or 3 contiguous plantations in each locality will be continued who will be responsible for the protection of the plot.

676. *Bank erosion.*—In the padugais of the Cauvery and Coleroon the banks get eroded during floods causing loss of valuable land. Sometimes entire plantations are washed away. It is therefore necessary to undertake effective soil conservation measures to consolidate the banks. The slopes of the banks should be eased and planted with species which are good soil binders such as *Arundodonax, Saccharuni officinarum*, Ipomea, Palmyrah, Vitex, Aloe, Pandanus, etc., and suitable grass species. Such soil conservation works should be done in a systematic manner whenever an area is taken up for planting. With a view to consolidate the bank it is prescribed that one or two rows of bamboo be raised at 7 m. apart from raizomes along the river frontage.

677. *Pests and diseases.*—Pest and disease occurs on an epidemic scale so far in this division. A few insects like ants, white ants and crickets damage the seeds and seedlings in the nursery. Borers also damage the stems in the tree stage but the damage is isolated and insignificant. The pests and diseases affecting casuarina plantations and the control methods are detailed in Appendix IV.

678. *Statistics.*—The quantity of firewood and poles extracted by the contractor during the clearfelling of the coupes will be furnished to the Range Officer every month. These data along with the details of monthly cost of raising the plantation will be posted regularly in the plantation journal and ledger. Such records of yield and cost of plantations should be maintained accurately to assess profit and loss.

679. *Control.*—Control journal, control forms, plantation journal and ledger, nursery journal and ledger, record of works, deviation statements, control maps will be maintained for the working circle as furnished in appendix XX and XXI. They should be posted up to date at the end of each financial year.

CHAPTER V—MANGROVE WORKING CIRCLE.

SECTION 1—GENERAL CONSTITUTION AND CHARACTER OF THE VEGETATION.

680. *General constitution.*—This working circle comprises of the mangrove forests of Muthupet reserved forests and the un-exploited area of 121.41 hectares in Tamarankottai felling series proposed in the previous plan. Pudupattinam forests situated at the month of Coleroon river included in the mangrove working circle under the previous working plan is excluded in this plan period in view of the poor and unsalable nature of growth. The mangrove forests of Talanayar, Chatram (Thuraikadu) which have been worked during the previous workingplan period will be given complete rest during the currency of this plan. As far as possible areas with blanks and scanty growth have also been excluded from the working circle.

681. *Character of vegetation.*—The areas proposed fall under Champion's Tidal Swamp forests (Mangrove forest) a description of which is given in Chapter II of Part I. The mangrove forests develop along the sea-coast between the low and high tide limits on frush aluvial deposits. The floristic composition in a mangrove forests varies greatly within short distances depending on the degree of salanity and the duration of inundation during the different tides. They exhibit distinct zonations and are confined along the fringes of lagoons and streams. The mangrove forests are basically of a transitory nature exhibiting characteristic variation and irregularity in growth and cannot be regenerated in situ. The exhibit special adaptations such as stilt roots (Hizophora) and pneuma tophores (Avicenn a) due to defective soil aeration and viviparous germination, (i.e.), germination of the seed and partial development of the embrys takes place while the fruit is still on the tree to overcome the peculiar edaphic factors of the locality.

Avicennia officinaalis is the predominating species which is useful as fuel and small timber. Other species are inferior as fuel due to irritant smoke produced by them and are not in much demand. The bark of the most of the mangrove species is rich in tannin although it is not used commercially so far.

Thillai (*Excoecaria agallocha*) is not exploited because of the injurious effects such as blindness and bl ste s on the skin said to be caused by the exadation of latex from it. Further Thillai is less favoured as fuel due to irritant smoke produced by the same.

SECTION 2—DIVISION OF THE AREA.

682. The total area of the working circle is about 302.67 ha. and is divided into two felling series as detailed below:—

Name of the series	*Area in ha.*
1 Tamarakottai felling series	121.41
2 Muthupet felling series	181.26
Total ...	302.67

SECTION 3—ANALYSIS AND VALUATION OF CROP

683. Mangrove forests undergo periodic changes due to new accretions and vegetation colonising freshly silted up areas. Moreover some of the areas which contained tree growth in the past have gone above the high flood level resulting in the disappearance of tree growth. Therefore the entire mangrove areas have been stock maped afresh to determine the correct boundaries of the existing tree growth. The wooded area is about 3 to 4 per cent of the gross area in Muthupet mangrove forest. In the absence of regular inundation the quality of Avicennia deteriorates rapidly.

SECTION 4—METHOD OF TREATMENT

684. The predominant species in the mangrove forests is Avicennia, which is also economically most valuable among the mangrove species. Natural regeneration of Avicennia is plentiful on account of viviparous seeds which are produced in abundance. Hence the silvicultural system proposed is clearfelling with natural regeneration. However all advance growth up to 2m in height will be retained at the time of clear-felling.

685. *Rotation.*—No precise data is available to fix up a scientific rotation. Avicennia reaches a mean girth of 30 to 36 cms which is the most suitable seize for use in the brick kilns without splitting. This size is attained at the age of 20 years. Hence a rotation of 20 years is prescribed.

686. *Yield.*—The yield is regulated by area. The area of the annual coupe is arrived at after excluding all the blanks and taking into account only the effective wooded area. The type and growth of the crop does not justify division into equproductive areas.

SECTION 5—METHOD OF EXECUTING FELLINGS

687. *Annual coupe and lay out.*—One coupe in Muthupet series will be felled every year as indicated in the Working Plan map. The coupe number to be exploited in the mangrove series and the year of working, etc., are given in Section 6 under the tabular statement of fellings. While dividing the annual coupe natural features such as lagoons, creeks, etc., which may serve as boundaries have been taken into consideration as far as possible.

688. *Survey and demarcation.*—The coupe to be felled will be surveyed in accordance with the Working Plan map and demarcated on the ground by 3 m wide cut lines. This work will be completed by the end of August of the year previous to felling. All creeks in the coupe that are useful for transport of fuel or those which can be easily converted into water ways must also be surveyed and plotted on the map. The trees adjoining the boundary will be ring marked and serially numbered by coal tar.

689. *Division into strips.*—Each coupe will be divided into convenient strips by means of cut lines 1½ metres wide. But if a coupe is naturally sub-divided by creeks or blanks, lines need not be cut though areas of individual strips may not be equal. Depending upon the size of the coupe, there will be two or three strips in each coupe. While numbering the strips the accessible portion or portions adjoining the worked coupes will be given the first number.

The survey of the coupe will be checked by the District Forest Officer according to the prevailing orders of the Chief Conservator of Forests.

The correct area of the coup after checking by the District Forest Officer will be computed on the basis of survey. Difference between the area computed by actual survey and the area shown in the Working Plan map will not constitute a deviation requiring special ratification, unless it exceeds 10 per cent.

690. *Agency of exploitation.*—The fuel coupe will be exploited through the agency of contractors. The coupes will be sold in public auction in November or early in December to enable the contractor to commence work from 1st January.

691. *Lease period.*—Generally the lease period will be one year from January to December. The voidah for working of the coupes will be decided on the basis of area as indicated below:—

For Coupes 8 hectares and less	6 months
For Coupes above 8 hectares and up to 20 hectares.	9 months
For Coupes above 20 hectares.	1 year.

692. *Coupe arrears.*—In the event of a coupe remaining unsold for any reason in a particular year it shall be offered for the sale in the next year as an arrear coupe. Coupes which remain unsold for three consecutive years will be withdrawn from subsequent sales. The District Forest Officer will record the fact in the control journal and make suitable entries on the control map.

Any portion of the coupe remaining unfelled at the end of the lease period will be surveyed and sold in the subsequent year with the next year's coupe if it is of sufficient extent.

693. *Felling rules.*—(1) Felling of the coupe will proceed systematically from one end of the coupe strip by strip. Strips will be so numbered that the contractor does not remove the felled material through worked strips since it will affect the regeneration of Alayathy seedlings. The contractor shall be permitted to enter a new srip only after the work in the previous one has been satisfactorily completed and the produce removed, inspected and passed as satisfactory by the Range Officer.

(2) All fellings should be done with sharp cutting implements so as to leave the bark intact adhering to the wood all-round. Stumps should be left with a clean surface at the time of cutting. No stumps should be uprooted.

(3) Nocharcoal burning will be allowed in any part of the forest land.

(4) No thorny growth, brushwood, etc., should be left on stumps or coupe lines.

(5) No removal of firewood will be permitted without proper billetting and stacking and inspection by the Range Officer. The size of the stacks should be uniform. Brushwood less than 30 cms in girth may be removed in head-loads without billetting and stacking.

(6) The removal of the produce by boat is permitted.

(7) No Alayathy seedlings less than 8 cms in girth at the base nor trees below 2 m in height shall be felled.

(8) The contractor should not block up by throwing brushwood any creek big or small passing through the coupe or boundary of it. This is important since the natural regeneration of Avieennia depends on the free floating of seeds and hence this condition must be stictly enforced.

(9) Timber, if any, will be kept at stump site until it is hammer marked and passed by the Range Officer.

(10) The contractor shall sell light fuel such as thorns and twigs to the members of jaggery societies at 9 paise per headload.

SECTION 6—TABULAR STATEMENT OF FELLING

694. As per the previous plan by K.P.D. Rao 13 coupes were formed in Tamarakottai felling series out of which 10 coupes (i.e.), coupe No. I to X were worked up to 1970 and the balance three coupes are proposed for working from 1971 to 1973. These three coupes will be exploited during this plan as specified below:—

Year of working.	*Coupe No.*	*Area in hectores.*
1971	XI	40.47
1972	XII	40·47
1973	XIII	40.47

After exploitation the entire series will be given complete rest during the rest of the plan period.

The sequence in which coupes have to be worked in Muthupet felling series during the period of the plan is indicated in the following tabular statement:—

STATEMENT OF FELLING IN MUTHUPET FUEL SERIES OF THANJAVUR FOREST DIVISION.

Serial number and name of range.	*Series.*	*Year of felling.*	*Group number.*	*Area in ha.*
1 Pattukottai	Muthupet ..	1974	I	28 32
		1975	II	40 46
		1976	III	25 89
		1977	IV	24 28
		1978	V	29 94
		1979	VI	32 37
	Total	..	..	181 26

ABSTRACT.

	HECTARE.
1 Tamarakottai series (un-exploited balance area proposed in the previous plan.)	121 41
2. Muthupet series	181 26
Total ..	302 67

SECTION 7—OTHER REGULATIONS

695. *Reclamation of land.*—Vast areas of saline and marshy blanks can be suitably reclaimed after determining their ecological status. Where conditions for mangrove are not favourable and in areas outside the normal habitat of the mangrove species, other species such as *Prospis juliflora, Acacia arabica, Azadirachta indica, Salvadora indica, Acacia leucophloea, Pongamia pinnata, Barringtonin aculeata, Inga dulce, Thespecia populnea, Tamarix gallica* can be tried on a small scale.

There is great need for initiating research on the regeneration, exploitation and management of mangrove forests and afforestation of saline blanks both dry and marshy. Experiments are also necessary to find out the best method of regenerating these forests as also for augmenting stocking of economically valuable species.

696. *Demarcation of felled coupes.*—Felled coupes should be demarcated by fixing durable metal boards of 40 cm × 20 cm (since stone slabs are difficult to obtain) nailed on the living trees near the salient corners indicating the number of the coupe, year of working, etc., along with the number of the adjoining coupe and its year of working. Posts of 3 to 4m in length buried to 1 to 1.5 m into the ground will be used where living trees are not available to fix up the boards.

697. *Regulation of grazing.*—As a result of heavy grazing, Avicennia is not allowed to attain a height above the reach of cattle. Hence as prescribed in the previous Working Plan the entire area of the working circle is closed to grazing permanently.

698. *Record of statistics.*—The contractor will furnish monthly accounts of removals of firewood and timber from the coupe not later than 10th of the succeeding month. Such accounts should be supported by the counterfoils of all permits issued by him.

The following conversion factors may be adopted :—

1.4 cubic metre of timber = 1 tonne.

40 head-loads of fuel = 1 tonne.

2 cubic metres of stacked fuel = 1 tonne.

699. *Control maps.*—After the receipt of the completion report the worked area of the coupe will be posted in the control map. The year of working will be noted in black ink at the centre. Whenever the coupe leased out differs from that prescribed the actual shape of the coupe shall be super imposed on the prescribed one with a dotted boundary line. It is desirable that the District Forest Officer carries the posted control map to the field during the time of checking of the survey of the fuel coupe to examine the postings and rectify mistakes if any in the lay-out coupes. When the coupe or a portion of it is worked as arrears the year of working of the arrear area, etc., should be indicated.

The control map will show the wooded and blank areas of the coupes as ascertained by actual survey and the area leased out for felling and actually felled indicating the year of felling Oother details such as the actual courses of small creeks, etc. that might have been omitted in the Working Plan map but are subsequently observed on the actual survey of the coupe shall also be marked.

700. *Control records.*—The control records shall be maintained and posted up-to-date at the end of each financial year by the District Forest Officer in the forms prescribed.

CHAPTER—VI MINOR FOREST PRODUCE WORKING CIRCLE.

SECTION 1—GENERAL CONSTITUTION.

701. The minor forest produce working circle covers all the reserved forests, the reserved lands and the unreserves of the division that are under the control of the Forest Department, and this working circle will regulate the exploitation of all the items of forest produce which have not been separately dealt with under any of the other working circles.

SECTION 2—ANALYSIS OF THE CROP.

702. As the forests covered by this working circle are mainly scrub type the quantity of the minor forest products available is not considerable. So far unique feature of this working circle in this division is that right of fishing is a major item of minor forest produce.

703. *Kinds of produce.*—The main items of minor forest produce collected in this division are—Tamarind, Wood apple, Sundakai, Konnai bark, Ettikottai, Eluppai and Elendai fruits and Palmyrah usufruits, coconut, etc. There is keen demand in this division for certain items of minor forest produce such as avaram bark, tamarind and sundakai. The usufructs of cashew dealt separately under cashew working circle.

The following items of minor forest produce occur in the reserve forests and reserve lands, but in small quantities.

LIST OF MINOR FOREST PRODUCE ITEMS IN THANJAVUR FOREST DIVISION.

Serial number and name of the produce.	*Botanical name.*	*Part of the plant useful.*	*Remarks.*
(1)	(2)	(3)	(4)
A. Bark.—			
1 Avaram bark	*Cassia auriculata*	Tanning.	..
2 Konnai bark	*Cassia fistula*	Do.	..
B. Fruits.—			
3 Nellikai	*Emblica officinalis*	Pickles, edible.	..
4 Wood apple	*Feronia elephantum*	Edible.	..
5 Tamarind	*Tamarindus indica*	Do.	..
6 Veerai	*Drypetes sepiana*	Do.	..
7 Kalakkai	*Carrissa congesta*	Do.	..
8 Elendai	*Zizyphus moritiena*	Do.	..
9 Sundakai	*Solanum pubescens*	Do. Pickles.	..
10 Kodukapuli	*Inga Gulco*	Do.	..
11 Coconut	*Cocos nucifera*	Coir making and edible.	..

Serial number and name of the produce. (1)	Botanical name. (2)	Part of the plant useful. (3)	Remarks. (4)
12 Palmyrah	*Borassus flabellifior*	Edible, coir and coir making.	..
13 Ilupai	*Madhuka longifolia*	Edible (flowers) fruits yield oil and cake.	..
14 Mango	*Mangifera indica*	Edible	..
15 Soapnut	*Sapindues emarginatus*	Washing	..
16 Custard apple	*Anona souarmosa*	Edible	..
17 Palai	*Manilkera hexandra*	Do.	..
18 Naval	*Syzygium cumini*	Do.	..
19 Eacham	*Phoenix sylvestris*	Do.	..
20 Ilupai	*Bassia latifolia*	Oil	..
21 Neem	*Azadirachta indica*	Oil	..
22 Pinnai	*Calophyllum insohyllum.*	Oil	..
23 Silk cotton	*Malabarieum*	Stuffing, mattresses.	
C. Seeds.—			
24 Porasankotten	*Thespasia populner*	Medical purposes.	..
25 Etti Kottai	*Strychnos nux-vomica.*	Yields strychaine	..
26 Pungam	*Pongamia pinnata*	Oil	..
D. Leaves.—			
27 Kayan leaves	*Memycelon umbellatum.*	Dyeing	..
28 Eacham	*Phoenix avanlis*	For mat and roofing.	
29 Aloe fibre	*Aloe americana*	For broom fibre.	..
E. Stem.—			
30 Canes	*Calamus roting*	Basket making	..
F. Flower.—			
31 Magali	Manilkara elengai	Flowers ornamental seeds give oil.	..

Serial number and name of the produce. (1)	*Botonical name* (2)	*Part of the plant useful* (3)	*Remarks.* (4)
F. Flower.—cont			
32 Thazhai	*Pandanus odaratissimus*	Flower	..
33 Kattamanaku	*Jatropha gossipifolin*	Fence plant ..	..
G. Other items.—			
34 Lime shells (Kilinjal) ..	....	For lime ..	..
35 Koondaraipu (Grass) ..	....	.. ..	..
36 Vembadampattai	*Ventilago maderaspatana*	Root bark. ..	..

SECTION 3—METHOD OF TREATMENT.

704. The right to collect the minor forest produce in this division will be sold in public auction in May or June. The lease period generally will be from 1st July to 30th June of the succeeding year. The existing system of exploitation through the contractors will continue.

705. *Details of minor forest produce leases.*—The important items of minor forest produce such as polmyrah, cocoanut elendai and fishing, etc., for which there is sustained demand will be sold as separate units.

706. *Other items of minor forest produce.*—All other items of minor forest produce will be sold as one unit for the entire division with a lease period of one year from 1st July to 30th June next year.

No minor forest produce items (including Konnai and Avaram barks) will be sold from Kodiakadu reserved forests since it is declared as Wild Life Sanctuary where human activities are not desirable in the interest of preservation, promotion and conservation of wild life. Moreover there is not much demand for the minor forest produce items in Kodiakadu as evident from the gradual decline in the minor forest produce revenue.

The collection of the various minor forest produce items will be subject to the following conditions :—

(1) The mazdoors engaged by the contractors will be allowed to use small knives to help them to clear thorny growth and in the case of Avaram and Konnai barks only to cut shrubs and branches to extract the produce provided for in the agreement.

(2) Any misuse of knives shall be treated as a breach of the agreement conditions,

(3) In cases of removals from the leased area to the depots situated outside the reserved forests and from depots situated within the reserved forests Government permits shall be used exclusively.

(4) The removals from the leased area shall take place only between 6 a.m. and 6 p.m.

(5) The quantities collected and exhibited in the contractor's monthly account shall tally with the total quantities covered by the permits issued during the corresponding period.

(6) Purchasers who are not lessees shall not be allowed to collect the produce.

(7) Lopping of trees for manure leaves shall be prohibited.

(8) Fingerlings of below 15 cms. should be handed over to the Fisheries Department free of cost in the case of fishery leases.

707. *Palmyrah.*—There are about 3,500 palmyrah trees in Manamelkudy forests. The practice has been to lease out the right to collect the usufructs and leaves for which the demand has been meagre.

In view of the suspension of prohibition in the State with effect from 30th August 1971 there may be keen demand if the palmyrah trees in Manamelkudy are leased out for tapping toddy. Hence it is proposed that in future the palmyrah trees in this block be leased out annually in auction for tapping toddy. The District Forest Officer consider dividing the blocks into convenient number of units for the purpose of sale.

The period of lease will be 1st January to 31st December.

708. *Disposal of dead palmyrah.*—Dead palmyrah trees should be enumerated once in two years and sold in auction standing.

709. *Improvement to palmyrah.*—There is profuse natural regeneration of palmyrah in patches in Manamelkudy forests which is heavily suppressed by other miscellaneous jungle growth. It needs tending. Hence it is prescribed that all the miscellaneous jungle growth that are suppressing and interfering with the natural regeneration of palmyrah should be cut and cleared once in three years beginning from 1971–72 and soil lightly up around the palmyrah seedlings during August–September before the onset of North-east monsoon.

710. *Coconut plantations.*—The coconut plantations at Manamelkudy when they come to yield will be sold as a separate lease unit. Generally each plantation will be treated as a separate unit. However it is left to the discretion of the District Forest Officer to combine one or more units or to sub-divide the units as the occasion warrants.

711. *Lease period.*—The lease period will be for three years commencing from April 1971. The intention is that the lessee will maintain, manure and do soil working for the plantation, if the lease period is long.

Condition of lease.—(1) Lessee shall remove all the dead leaves, dried leaf stalk, dried spathe and borers infecting the coconut palm and keep the palm clean.

(2) He shall remove and destroy the Rhynoodores beetle and kill the caterpillars that are destructive to the growth of coconut palms.

(3) He will report to the Range Officer immediately as and when the disease and pests are observed in the palms.

(4) The lessee shall not tap the coconut trees for pathaneer or toddy.

712. Coconut has been raised over an area of 49.38 hectares in Manamelkudy between 1963 to 1965. Although the stocking is fairly satisfactory in these plantations growth is not appreciable. Cultural operations such as deep ploughing, forking the soil, formation of bunds and trenches around the plants are the measures suggested for improvement of coconut plantations and should be done by the lessee of the plantation.

The following prescriptions except (1) are suggested for the improvement of the existing coconut plantations by the lessee :—

713. 1. *Clearance of jungle growth.*—In area of about 4 hectares miscellaneous jungle growth has reasserted itself vigorously suppressing the coconut seedlings which should be immediately clearfelled and uprooted. This shall be done by the department.

714. 2. *Soil working.*—Ploughing should be done before the onset of monsoon to a depth of 15 to 20 cms. regularly once in a year.

715. 3. *Watering.*—Watering the backward plants will be done during the extreme period of drought in summer months.

716. 4. *Sowing of cover crop.*—Sowing of leguminous species such as Kolingi, Kalapagonium, Sesbania, etc., will be done at the rate of 5 to 6 kg. per hectare before the onset of monsoon after raking up the soil to a depth of 3 to 6 cms. in between the coconut rows to improve the fertility of soil.

Every year the cover crop can be ploughed in situ which will naturally increase the fertility of the soil.

717. 5. *Mulching.*—Sea weeds which are abundently available in the vicinity will be collected and mulched around each seedling before the onset of dry weather which will keep the soil moist and prevent the ground from becoming hard. It will lessen the bad effects of drought conditions and promote better growth of the palms and control the weed growth during rainy season. Further it will help to improve the nutrient status of the soil.

718. 6. *Replacement of casualties.*—Replacement of casualties will be done by planting good varieties of seedlings obtained from the State coconut farm, Pattukottai. The immediate surroundings of the newly planted seedlings should be clean weeded and the surface soil kept in a friable condition by digging or forking the land to promote the development of roots. The newly planted seedlings should be watering regularly in the absence of rains till they strike roots and get established. It is also necessary to continue watering the seedlings in the dry months for the first two years at least. During heavy monsoon rains care should be taken to see that water does not stagnate in the pits continuously for long periods.

The palms that are showing continued unhealthy and stunted growth or unproductive nature should be removed and replaced as early as possible. Light shading with palmyrah or coconut leaves will be given to the younger seedlings till their establishment to protected them from the scorch of the sun.

719. 7. *Watering.*—Watering is necessary both in the young as well as in the older plantations. It will increase the yield as well as promoting the growth of plants. Hence it is desirable to water the plants in dry months, for which installation of pumpset is necessary.

8. *Manuring* :

720. 8. *Manuring.*—Proper manuring from the very beginning is necessary to give a good start to the coconut seedlings since the soil at Manamelkudy is poor and is deficient in major plant nutrients. Proper manuring of seedlings will increase yield. Manuring should be done when there is optimum moisture in the soil during the rainy season.

Application of chemical fertilizer will be done in semi circular trenches of 30 cms. width and 23 to 30 cms. depth dug out at a radius of 1.5 m. around the plant.

Chemical fertilizer (N.P.K. Mixture) will be applied as specified below in the ratio of 6 : 6 : 12 (standard 3 mixture) :—

Age.	*Quantity chemical fertilizer to be applied in kg. per tree.*
2 years	1 kg.
3 and 4 year	1.75 kg.
5 and 6 years	3.5 kg.
7th year and after wards	5 kg.

In addition to the chemical fertilizers green manure, cowdung, ash or compost manure may also be applied.

721. 9. *Protection from pests and diseases.*—The young coconut palms are susceptible to attack from various pests and diseases. Frequent inspection of plants may therefore be done and control measures taken promptly. Termites, Rhinoceros beetle, coconut caterpillar and Red palm weevil are the more important pests commonly found in coconut plantations.

Shoot-rot and bud-rot diseases are also common in the seedling stage. Prompt measures taken in the initial stages alone will help to save the seedlings and hence early detection is very important. The adult palms are found to be attacked by a number of pests of major and minor importance and all these are capable of causing considerable damage resulting in reduced yields. The need to take prompt control measures against them cannot be over emphasised. Control measures against these pests and diseases are described in detail in appendix IV.

722. 10. *Grazing.*—A barbed wire fencing has been provided for the plantations which should be maintained in good repair.

723. *Fishery leases.*—There will be four fishing leases as mentioned below and the existing practice of leasing out will be continued :—

A. Muthupet fishing lease.—The right of fishing in the pits and puddles of Muthupet reserved forests is given on negotiation to the Fishermen's Co-operative Societies as per G.O. No. 865, Food and Agriculture, dated 6th March 1965, subsequently modified in G.O. Ms. No. 1023, Agriculture, dated 31st March 1970. This will be continued in accordance with the orders of Government from time to time. If the Society is not willing to take up the unit then it can be sold in public auction.

In Muthupet reserved forests fishing is free in the lagoon to the fishermen of Muthupet and adjoining villages.

B. Thottam fishery lease.—The right of fishing in the pits, puddles, streams and creeks of Chatram forests (Vadakadu, Maravakkadu and Thuraikadu) will continue to be allotted to the Fishermen's Co-operative Societies by negotiation as per G.O. Ms. No. 865, Food and Agriculture, dated 6th March 1965 and the Revenue realised will be credite to the Fisheries Department. If the Society is not agreeable to take up the unit then it can be sold in public auction after proper advertisement.

C. Manamelkudy fishing lease.—The right of fishing in the tanks and streams of Manamelkudy forests will be sold annually as a separate unit by the District Forest Officer and the revenue realised will be credited to the Forest Department.

D. Talainayar fishing lease.—In Talainayar reserved forests, the right of fishing is sold in auction every year by the Revenue Department along with the right for fishing in the creeks and streams in the adjoining unreserves. The Forest Department is issuing permits and is responsible for protection of forests. Thus there is a dual control which is likely to cause difficulties in administration. The Government may be addressed to authorise the Forest Department to sell the fishing lease in Talainayar forest.

The right of fishing in Muniyappan Eri, Palamkulam and Anaithittukulam of Kodaikadu reserved forests will be discontinued since the Kodiakadu forests is declared as Wild Life Sanctuary.

724. *Konnai and Avaram bark.*—Konnai and Avaram bark in the entire division will be sold once in five years as a separate unit with a lease period of one year from July to June of the succeeding year.

725. *Elendai in Maharajapuram.*—At Maharajapuram (Plantation Range No. IV, Sirkali) Elendai trees occur over an area of 1.6 hectare for which there is a keen demand and it fetches on an average a sum of Rs. 450 per annum. Hence it is prescribed that this unit can be sold as a separate unit with a lease period of one year commencing from July to June of the next year.

SECTION 4—OTHER REGULATIONS.

726. *General.*—The District Forest Officer will have the discretion to split up or club together lease units and to add items to a unit or delete items from a unit as the occasion demands.

SECTION 5—CONTROL.

727. *Accounts.*—The contractor shall render accounts to the Range Officer concerned regarding collections and removals of various minor forest produce made by them by 10th of every month. The contractors should be insisted upon to furnish accounts only in the prescribed metric units.

The yield figures should be furnished annually even in the case of lease wilth longer lease periods or as soon as the collection is over for the year, and where the period of lease than a year, along with the completion report. Separate accounts will be maintained for each lease unit.

728. *Control.*—The control forms prescribed for this working circle are given in appendix XX and XXI and will be posted every year by the District Forest Officer.

CHAPTER VII—MISCELLANEOUS REGULATIONS.

SECTION 1.—GRAZING.

729. Grazing will be permitted in all the reserved forests and reserved lands of the division except in areas that are closed to grazing from time to time for silvicultural or other reasons.

The objects of management of the various working circles.

(1) to provide adequate pasture for the cattle of adjoining villages in the vicinity of the forests, consistant with the conservation of forests without affecting in any way the objects of management of the various working circles.

(2) to limit the grazing incidence to the extent possible to what the forests can reasonably sustain and incidentally to realise nominal revenue by levy of licence fee for grazing of cattle in the forests.

(3) to take necessary steps to improve the grazing facilities.

Cetrain specified areas will be permanently closed to grazing in the interest of forest conservancy while others will be closed from time to time under the orders of the District Forest Officer for temporary periods for various reasons.

730. *Temporary closure.*—The following areas will be temporarily closed to grazing for silvicultural reasons :—

(1) All cashew and casuarina plantations will be closed to grazing for the first five years including the year of formation.

(2) All miscellaneous plantations will remain closed to grazing for a period of five years including the year of formation.

(3) All areas where experiments are conducted will be closed for such period as to be determined by the State silviculturist.

The District Forest Officer may close any area temporarily as a punitive measure in case of fire caused due to negligence or incendiarism by the people of the locality or graziers under the provisions in the Madras Forest Manual (G.O. Ms. No. 51, Development, dated 4th January 1940) provided :—

(*a*) that the area closed to grazing does not exceed 400 hectare at a time.

(*b*) that the District Forest Officer submits a report immediately to the Collector and the Chief Conservator of Forests.

731. *Permanent closure.*—The whole area of the Mangrove working circle and coconut plantations at Manamelkudy forests will be closed to grazing permanently.

The annual grazing notification shall be published in May in the District Gazette specifying the areas to be closed and the conditions regulating the grazing in the different parts of the division.

732. *Regulation of grazing.*—Grazing will be regulated by issue of permits subject to usual conditions. All cattle except goats will be permitted to graze in the forests. No discrimination will be made between the local and foreign cattle for the purpose of issual of grazing permits. Cattle taken from or into patta lands along recognised paths and roads through the forests will not be regarded as committing trespass.

733. *Issue of permits.*—Grazing permits will continue to be issued departmentally as per the standard practice followed all over the State.

734. *Grazing rates.*—The following are the prescribed grazing rates :—

Description of animals	*Rate per head*
Sheep	0.50
Cow, Bull, Ass and horse	1.00
Buffaloe	2.00

735. *Grazing year.*—The grazing year is from 1st July to 30th June of the following year.

736. *Grazing unit.*—The entire division will form one grazing unit.

737. *Penning.*—No penning permits have been issued in the past as the cattle adjoining the forests can reach the forests and return to the village in the evening. Hence there is no demand for penning in any of the forests in this division.

738. *Cutting and removal of fodder grass.*—Cutting and removal of fodder grass from the forests except in closed areas will be permitted free of cost on head loads for bonafide domestic use.

Removal of grass in cart loads at the rate of one rupee per cart load will be permitted (Vide G.O. Rt. No. 1332, Agriculture Department, dated 6th June 1968.)

739. *Demarcation of closed areas.*—All areas closed to grazing either temporarily or permanently will be conspicucously marked on the grround by means of red sign boards placed at salient points. In addition to the notification in the District Gazette, the people of the villages must be informed of the areas closed to grazing by means of tom-tom.

740. *Improvement of watering facilities.*—There are two tanks, Morasakulam and Karathanpallam, in Nappugai ex-zamin forests. Cattle grazing inside the forests resort to these water sources for drinking water. These water sources will have to be repaired periodically which will consist of

(1) desilting the tank beds to increase the storage capacity of the tank,

(2) repairs and strengthening of embankments wherever necessary,

(3) all the unwanted thorny vegetation on the foreshore that prevent the inflow of water should be cut and removed to permit the inflow of water to the tanks.

741. *Miscellaneous regulations.*—It is extremely important that the cattle resorting to Kodiakadu reserved forests are inoculated against contagious diseases which are likely to spread to the wildlife in the locality. Only inoculated cattle should be issued grazing permits.

It is also advisable to enhance the grazing fees inside sanctuaries so as to discourage cattle grazing.

The control forms prescribed in the appendix XXI shall be posted at the end of each grazing year and maintained by the District Forest Officer.

A grazing map of the division on a scale 1 cm. = 1 km. shall be prepared annually in the District Forest Office showing clearly the areas closed temporarily and permanently to grazing.

SECTION -2-FARM FORESTRY

742. Farm Forestry was started in Thanjavur forest division in the year 1966 as a Third Five Year Plan scheme. The object of farm forestry is to create compact forests in the village porambokes, tankbeds in order to increase the resources of fuel, small timber. fodder and green manure leaf with a view to meet the demands of local villagers.

743. *Benefits of the scheme.*—The scheme provides employment to the rural population since most of the amount to be spent on this scheme will be paid to the local people as wages. It meets the demand of the local population in respect of fuel, fodder, manure, leaf etc. Further it stops soil erosion, protects the lands from loss of fertility and prevents silting up of rivers and reservoirs.

744. The total area planted up to 1970 is 460.00 ha. and the details of various plantations are given below :—

Serial number of forma-	*Locality. the block.*	*Name of*	*Spacing planted.*	*Spacing*	*Area in ha.*	*Remarks survival age.*
(1)	(2)	(3)	(4)	]5[	]6.	[7]
1. 1966	Karuvarancherry	Aranthangy	11' x 11'	Babul	40	50 per cent.
2. 1967	Alapiranthan	,,	Babul	11' x 11'	40	60 per cent.
3. 1968	Velnui	Avadyarkoil	,,	,,	40	74 per cent.
4. 1968	Alapiranthan	Aranthangy	,,	,,	40	65 per cent.
5. 1968	Narapanalakudy	,,	,,	,,	40	75 per cent.
6. 1969	,,	,,	,,	,,	40	85 per cent.
7. 1969	Idayar	,,	,,	,,	49	50 per cent.
8. 1969	Ponbethy	Avidyar koil	,,	,,	50	90 per cent.
9. 1970	Narapanalakudy	Aranthangi	,,	16½ x 16¼ cashew	40	90 per cent.
10. 1970	Ponbethy	Avadyarkoil	,,	11' x 11'	40	100 per cent.
11. 1970	Poovalur	,,	,,	,,	50	100 per cent.
					460	

745. *Constitution of the area.*—The lands which are outside the reserved forests and reserved lands are utilised for raising farm forestry plantations. They fall under different categories under the revenue classification such as poramboke, assessed waste, unassessed waste, etc. Each kind of land selected farm forestry shall be examined carefully and the species for planting and the technique chosen properly.

Areas will continue to be selected in the different Panchayat Union blocks and work done departmentally. The basis for selection of areas will be the Reconnaissance Survey report with such modifications as required by local investigations.

The annual planting area for the division will be governed by the various factors such as the target fixed in the annual plan scheme, availability of budget allotment, concurrence of Panchayat Union, etc. Hence it is impossible to prescribe definite annual targets or a plan period target.

Most of the future areas for farm forestry plantations are available only in Aranthangy taluk. A list of areas available for future planting is furnished in the following statement :—

LIST OF TANKS PROPOSED FOR RAISING FARM FORESTRY PLANTATIONS IN THANJAVUR FOREST DIVISION IN ARANTHANGI TALUK.

Serial number and name of taluk. (1)		*Name of the block.* (2)	*Number and name of village.* (3)
1	Aranthangy.	Aranthangy.	..
2	Do.	Do.	—
3	Do.	Do;	81
4	Do.	Do.	4
5	Do.	Do.	4
6	Do.	Do.	5
7	Do.	Do.	5
8	Do.	Do.	79
9	Do.	Do.	78
10	Do.	Do.	78
11	Do.	Avadiarkoil.	..
12	Do.	Do.	..
13	Do.	Do.	..
14	Do.	Do.	..
15	Do.	Do.	—
16	Do.	Do.	..
17	Do.	Do.	—
18	Do.	Do.	—
19	Do.	Do.	..
20	Do.	Do.	—
21	Do.	Do.	..
22	Do.	Do.	31
23	Do.	Do.	173
24	Do.	Do.	41
25	Do.	Do.	41
26	Do.	Do.	41
27	Do.	Do.	222
28	Do.	Do.	14
29	Do.	Do.	—
30	Do.	Do.	—
31	Do.	Do.	198
32	Do.	Do.	—
33	Do.	Do.	—
34	Do.	Do.	201
35	Do.	Do.	40
36	Do.	Do.	39
37	Do.	Do.	39
38	Do.	Do.	139

FOREST DIVISION IN ARANTHANGY TALUK.

Name of tank. (1)	*S.F. number.* (2)	*Total area of the tank.* (3)	*Area available in ha.* (4)	*Remarks.* (5)
Rathinakottai Peria Eri	F. 73	46 85	40 47	..
Idayar	F. 57	156 90	40 47	..
Mookudi Perinjakulam	F. 90	48 66	40 47	..
Sillattur Peria Eri	F. 157	66 98	60 71	..
Kunnakurumbi Peria Eri	F. 304	44 01	40 47	..
Nurpavalakadi Eri	F. 84	176 36	40 47	..
Nurpavalakudi Eri	F. 85	31 93	20 23	..
Sirunattanvayal Eri	F. 6-1	80 36	60 70	..
Peria Eri Rajendrapuram	F. 265-3	31 93	20 23	..
Settikulam-Rajendrapuram	F. 168	35 48	20 23	..
Poovalur Peria Eri	132-2	257 30	161 88	..
Vilanur Eri	F. 196	232 79	121 41	..
Ponbethi	F. 153-1	242 29	80 94	..
Avadiarkoil Eri	V.L.R	157 95	141 64	..
Poongudi Eri	V.L.R 157	69 62	40 47	..
Karuppur Eri	V.L.R. 1284	114 67	80 94	..
Piranobani Eri	V.L.R. 197	99 02	80 94	..
Koduvaiyur Eri	V.L.R. 38	61 27	40 47	..
Embakottai Eri	V.L.R. 266	23 88	40 47	..
Bhavanendal Eri	V.L.R. 2-A	20 23	80 94	..
Kattukavai Eri	V.L.R 1	71 40		..
Alangetta Eri	V.L.R. 1	24 86		
Idayanvayal Eri	V.L.R. 1	32 01	40 47	..
Aligianondel Eri	V.L.R.	31 58		
Perumadrur Eri	F. 81	91 00	40 47	..
Vellur Siruvaraikanmai	F. 117	80 48	60 70	..
Meyanur Eri	S. 118	100 46	80 94	..
Muraiyur Eri	S. 25	50 54	40 47	..
Thunjanur Eri	S. 68	101 95	80 64	..
Thalanur Eri	S. 1-1	136 29	101 17	..
Amanji Eri	F.18	58 99	40 47	..
Thiruponavasal	..	..	40 47	..
Poonivayal Eri	..	..	40 47	..
Amaradaki Eri	S.I.	121 20	80 94	..
Ennuthimangalam	..	..	40 47	..
Palandamavi	..	..	20 47	..
Veluvur Eri	S.I.	61 88	40 47	..
Okkur Eri	F. 87	239 93	161 88	..
Indannur Eri	S. 104	54 20	40 47	..
Narikudi Eri	S. 31	56 62	40 47	..
Sathiyakudi Eri	S. 103	46 12	40 47	..
		Total ..	2,286 76	

746. *Treatment of the area.*—The area selected are mostly lakes, tank beds and foreshores. Village porambokes are also selected. Kallar soil should be avoided. Similarly tanks which are likely to be under water for a prolonged period of 3 months or more should be avoided.

747. *Choice of species.*—Choice of species and proper technique of planting are the important factors which determine the ultimate success and popularity of farm forestry.

The species for planting will be mainly *Acacia arabica* (Babul) for tank beds with heavy clayey soil. For saline and alkaline soils species like *Acacia leucophloea*, *Acacia sundra*, *Inga dulce*, *Prosopis juliflora* may be suitable. In addition *Acacia, auriculiformis* *Eucolyptus terellidna*, *Callophyllum inophyllum*, *Thespesia populnea* may also be tried. Manure leaf species which are quick growing and can be lopped periodically such as Glyricidia maculata, *Delonix eleta* and minor forest produce yielding species like *Tamarindus indica*, *Pongamia pinnata*, *Azadirachta indica*, *Syzygium cumini*, *Maduka latifolia*, *Borassusflabellifer* may also be tried in foreshores which are not liable for submersion under water. The other miscellaneous species will include *Acacia planifrons*, *Acacia ferruginea*, *Albizzia amara*, *Albizzia lebbeck*, *Dalbergia sissoo*, *Eucalyptus teriticornis*, *Terminalia arjuna* (Mathy), etc.

Anacordium occidentale will be raised in upland tracts with red soil.

748. *Espacement.*—The general espacement for babul and other miscellaneous species will be 3.5 m. by 3.5 m. For cashew it will be 7 m. by 7 m.

749. *Rotation.*—The rotation generally adopted in other divisions for farm forestry plantations is 10 years. However in view of the relatively poor growth observed in plantations of this division a longer rotation of 15 years proposed. In respect of cashew a rotation of 40 years is tentatively fixed.

750. *Felling of Babul and miscellaneous species.*—No plantation will come under felling during the currency of this plan. However the District Forest Officer will inspect each plantation when due for felling to decide whether it is fit for exploitation. Sale of plantations which have not attained optimum growth could be postponed after reporting to the Conservator of Forests. The plantations shall be sold in public auction.

751. *Cashew.*—Cashew usufructs will be sold in open auction from the fourth year onwards.

Details for treatment of cashew are given in cashew working circle in Chapter III.

752. *Nursery.*—One central nursery will be prescribed for each Panchayat Union for raising seedlings. Nursery sites will be located as near to the planting areas as possible taking into account the availability of water.

753. Babul seeds will be pre-treated before sowing to facilitate easy germination. Seeds will be sown in polythene bags of 25 cms. by 12 cms. size during December and watered profusely. Watering will be continued and regulated till the seedlings are ready for planting. Cuttings of 1.5 m. in length will be used for planting in the case of Thespesia, Glyricidia and Delanix.

Babul seedlings should have a thickness of a pencil and a height of 30 cms. to 40 cms. Smaller seedlings do not survive if there is unexpected water logging early and larger seedlings are difficult to grow in the standard polythene bags.

754. *Preparation of site.*—Aligning and stacking at 3.5 m. by 3.5 m. will be done during June. Pits of 90 cms. cube will be dug during June–July.

755. *Planting season.*—Planting will be done between July and October and the best period is August. However if due to undue rains, the area allotted to babul gets submerged, planting will be done as the water begins to recede in December-January. In the case of cashew, seeds will be dibbled at the rate of one per pit during July-August.

756. *Planting.*—All seedlings should be watered profusely and taken to the plantation site on the day of planting. The polythene cover should be completely removed before planting. The seedlings should be planted carefully in the dug out pits with the ball of earth intact without disturbing the same around the roots. The soil will be refilled in the pit and a saucer will be formed around the pit. The ball of earth with the seedling should be handed carefully.

Cashew seeds will be dibbled as described in cashew working circle and a saucer will be formed to a radius of 50 cms. around the plant. Covering with brushwood thorns will be given around the plants to prevent animal damage.

Palmyrah seeds will be dibbled on the periphery of the plantation at 3 m. intervals.

757. *Soil working.*—One weeding and soil working around the plants to a radius of 50 cms. to a depth of 15 cms. will be done during September in the first year.

758. *Replacement of casualties.*—All casualties will be replaced before the end of rainy season during the first year, by using container seedlings. In submergible areas replacement will be done during January when the water recedes.

759. *Maintenance.*—In the second year replacement will be done during July-August. One weeding and soil working will be done as in the first year during September to a radius of 50 cms. around the plant and to a depth of 15 cms.

760. *Protection.*—Farm forestry areas should be protected from grazing in the early stages and from illicit felling in the later stages, since they are easily accessible. During the first year a plot mazdoor will be employed from the date of planting for every 40 ha. of plantations or more who will be responsible for the protection of the plantation.

761. *Closure to grazing.*—All farm forestry plantations will be closed to grazing for 5 years from the year of formation. Thereafter the grazing may be so controlled as to limit the incidence to not more than two cow units per hectare of the planted area. Goats will be prohibited from entering the plantations.

762. *Public relations.*—To ensure the success and popularity of the farm forestry scheme which is designed for the benefit of the rural population it is necessary for the departmental officers to seek the active co-operation and willingness of the public by propaganda and publicity explaining the need of such plantations, and by personal contact during the inspection of plantations. The co-operation of the Panchayat Presidents and village headman is also necessary for the full success of the plantations.

763. *Staff.*—The following number of staff will be employed as at present :—

Ranger—1.

Foresters—5.

As and when new plantations are taken up suitable increase in staff will be made as per Government sanction.

764. *Map.*—A key map of the division showing the proposed areas for farm forestry plantations has been given along with the working plan maps. Detailed sketches of individual regeneration areas so far planted showing the water spread areas and area proposed for planting are also furnished for information and guidance.

SECTION 3—WILD LIFE.

765. Government in their G.O. Ms. No. 1821, Agriculture Department, dated 13th June 1967 notified the following areas in Thanjavur district as "The Point Calimere Wild Life Sanctuary".

Thanjavur district	Tiruthuraipoondi **Taluk No. 133, Kodiakadu** village.
Name of the Block	**Point Claimere Wild Life Sanctuary.**

The Sanctuary comprises of the following areas :—

The **Sanotuay** comprises of **the** following **areas** :—

Kodiakadu reserved forests	3,645·00	(1475·13 ha.)
,, Extension I R. F. .. .	584·30	(236·47 ha.)
,, Extension II R. F. .. .	25·12	(10·17 ha.)
,, Extension III R.F. .. .	17·40	(7·04 ha.)
Total ..	4,271·82	(1728.81).

BOUNDARIES.

North.—Starting from post No. 1 at the north west corner of Kodaikadu reserve (notified as reserved forests under Section 16 of Madras Forest Act in Revenue Department No. 188, dated 4th May 1892 published at page 598 of Part I of the *Fort. St. George Gazette*, dated 10th May 1892) the boundary runs towards east along the northern boundaries of Kodikadu. Extension I, II and Kodiakadu Extension III reserved forests (notified as reserved forests under Section 16 of Madras Forest Act in notification No. 475, dated 23rd May 1938 published at pages 779–780 of *Fort St. George Gazette, dated* 31st May 1938) thence east along the notified northern boundary of the Kodiakadu reserved forests (Post No. 2) and thence east along the northern boundary of the Kodiakadu Extension I reserved forest (notified as reserved forests under Section 16 of Madras Forest Act in notification No. 475, dated 23rd May 1938 published at pages 779—780 of *Fort St. George Gazette*, dated 31st May 1938) to the Bay of Bengal at its north east corner of Kodiakadu Extension I reserved forests.

East.—Thence south along the Bay of Bengal to the point which a straight line with a bearing of 70.45 from the cairn at the south-east corner of the notified boundary of the Kodiakadu reserved forests and on the eastern boundary of Kodiakadu village between theodolite stones 58 and 59 and a distance of 14 chains (281.64 metres) from the latter, cuts it (the theodolite stone 59 is at the south-east corner of Kodiakadu village).

South.—Thence a straight line west to the cairn at the south-east corner of the Kodiakadu reserved forests, 14 chains (281.14 metres) north-west of theodolite stone No. 59, thence a straight line south-west to post No. 4 at the boundary of stone on the south boundary of Kodiakadu village about six chains (130.70 metres) west of the marine buildings and thence along the said village boundary to post No. 8 at the south-east corner of the village forest boundary.

West.—Thence a straight line north for about 92 chains (1850.75 metres) to post No. 11. Thence a straight line west for 58 chains (1166.77 metres) to post No. 18 on the eastern margin of the salt swamp; thence along the said margin to post No. 17 about 13 chains (261.52 metres) thence south of Kollappa Naickenmandapam; thence a straight line north-east to post No. 18 on the said margin of swamp about 4 chains (86.56 metres) north-east of the said mandapam; thence again along the east margin of the swamp to the starting point.

Remarks 1 :

A block of 28 acres (11.33 ha.) containing 6 patches of Kattukuttagai Patta lands is excluded from the Kodiakadu reserved forests and treated as enclosures.

Remarks 2 :

An area of 25.65 acres (10.38 ha.) marked in Kodiakadu reserved forests as railway line is excluded from the forests (it was disreserved during 1935 and given to the Railway Department).

The State Wild Life Officer, Madras will ex-officio be in the control of the Point Calimere Wild Life Sanctuary. He shall with the previous approval of the Chief Conservator of Forests prescribe the fees to be charged for the various amenities provided in the Wild Life Sanctuary.

The boundaries of the sanctuary shall not be altered nor shall its ownership or character be changed without the previous sanction of the Government.

The hunting, shooting or capturing of any wild animal or bird or fishing or setting up of traps or snares within the sanctuary is prohibited :

Provided that nothing in this rule shall prevent the District Forest Officer with the previous approval of the Chief Conservator of Forests from arranging for the destruction within the sanctuary of beasts dangerous to human life or of wild dogs or other forms of wild life which may become so numerous as to justify destruction.

Except with the permission of the District Forest Officer no one other than a Forest Officer shall carry any fire arms or explosives into the sanctuary.

The Chief Conservator of Forests, may with the previous approval of the Government, frame regulations for the management and control of the sanctuary.

No person other than an officer of the Forest, Police or Revenue Department on duty shall enter the sanctuary, halt in it, motor along the roads, photograph the wild life or exercise any other privilege except under a permit to be obtained from the District Forest Officer or any one duly authorised by him in this behalf in accordance with any regulations which may be framed for the purpose under rule 6 :

Provided that it shall not be necessary to take out permits to the use of roads and paths running through the sanctuary which have been declared as right of way open to men and cattle.

Any Forest Officer not below the rank of Forest Guard may, at any time when a vehicle is passing through the sanctuary call upon the driver of the vehicle to stop the vehicle and to keep it at rest for such time as may be necessary to enable him to make reasonable examination of the contents of the vehicle.

Forest operations shall continue within the sanctuary in the normal manner and contractors and their employees shall, during the period they are engaged upon forest operations, be required to take out free permits for the purpose of entering and halting in the sanctuary.

The Forest Officers shall continue to be responsible for the protection of wild life within the sanctuary as they are for that purpose, under the control of the District Forest Officer.

The sanctuary is noted for its incredible congregation of Black buck, Spotted deer, Wild pig and heavy concentration of migratory Waterfowl particularly flamingoes which is the praise attraction of this place.

There is a Forest Rest House right in front of Point Calimere Railway Station facing the sea. Government have also sanctioned the construction of a new Rest House of modern type with all amenities.

Heavy concentration of Flamingoes :

Twenty to thirty thousand Flamingoes can be seen here at one time during the season. When the fabulous flocks of flamingoes, their numbers extending to the horizon, take to flight, the sky looks pink. No naturalist can fully capture their splendour and reproduce it on paper.

Scenery.—Nature is wreathed in smiles here, the land and the sea holding each other in fond embrace The vast stretches of creamy sand with a thick pink carpet of suaeda bordered by roaring waves, the ozonish whiff, the sylvan setting, all conspire to lend the whole place an air of romance. The sun rise here is glorious.

Passerines :

During spring, the trees and shrubs laden with berries, red, orange and blue, attract thousands of frugivorous birds like the Green Pigeons, Rosy Pastors, Koels, Mynas and Barbets.

As the winter sets in, a huge wave of insectivorous birds rolls down to winter at Point Calimere attracted by the abundance of insect and vegetable food. The place starts seething with paradise flycatchers, Indian pittas, Shrikes, Swallows, Drouges, Minivets, Blue jays, Wood-peckers, Robins and Red starts, Babblers and Barbets.

Migratory Waterfowl :

Every year tens of thousands of migratory Waterfowl winter at Point Calimere. The tidal mud flats and the marshes literally covered with masses and masses of birds. The migrants include Garganey teals, Shovellers, Whistling teals, Pintals, Curlews, Avocets, Oyster catchers, Black headed gulls, the great blackbacked gulls, Whiskered terns, Little terns, Capsian terns. Godwits, Golden plovers, the great stone plover, Sand-pipers, Little stints, Red shanks, Green shanks, Ringed plovers, Reef herons, Whimbrels, Red necked phalarope, etc.

Lease of Minor Forest Produce :

Collection of minor forest produce from the sanctuary area has been prohibited.

Grazing.—It is advocated to restrict grazing as far as possible in the sanctuary area to avoid attack of rinderpest on the wild life in the sanctuary.

According to census taken in May 1971 the population of animals is as detailed below :—

Almost a total count of all Black buck was conducted with the help of the trainees of the Vaigai Forestry Training School and the territorial staff and the census was conducted on three consecutive days and the average of the three days comes to 890 which can be considered as a most reliable figure.

Improvements to be done for the sanctuary :

(1) A Biological Research Station has to be started. Even though it was proposed earlier, it was deferred for better times.

(2) Road has to be formed from Kodikarai Rest House to Light House to enable visitors to view Black buck, wild animals and numerous birds at close quarters.

(3) All lands including those of Devasthanam around the sanctuary should be acquired and added on the sanctuary as animals stray outside the reserved forest where poaching is undetectable.

(4) Three boats preferably shallow fibre glass ones must be provided.

(5) A documentary film should be taken about the sanctuary.

SECTION 4—SOIL CONSERVATION.

766. Soil conservation measures are suggested in all cashew regeneration areas where there is danger of erosion in order to conserve soil and moisture to arrest soil erosion and prevent run off. This will involve anti-erosion and reclamatory works such as construction of contour bunds, diversion channels, waste weirs, check dams and gully plugging, etc.

Soil conservation works in the cashew regeneration areas will be done prior to or during the year of formation in non-kumri areas while in kumri areas in the fourth year immediately after the area is vacated by the kumridars. In non-kumri areas contour bunding will be done as a part of preparatory work following tractor ploughing. The details of various soil conservation operations to be carried out in each year will be left to the discretion of the District Forest Officer.

767. The scheme for soil conservation will include two distinct types of measures as indicated below :—

(1) Mapping of land for classification according to slope, nature of soil, terrain and nature of erosion.

(2) Execution of soil and water conservation measures.

The method of laying out the mapping work for the soil conservation work is described below :—

Abeny level or dumpy level will be used for recording the levels both vertically and horizontally at an interval of 60 metres after establishing the datum level and those spots are peg marked on the ground. A contour map is prepared for the locality by interpolation with the help of these levels. The area will be divided in to three categories based on the slope, i.e., one per cent to two per cent, three to five per cent and above five per cent. The contour maps prepared will additionaly demarcate the areas suggested for check dams and other control works to drain the excess run off gently.

Formation and implementation of various measures to fight soil erosion are described below :—

Alignment, staking and construction of bunds :

768. Bunding work will be done from the top most point downwards. If due to certain reasons the top portions are not to be afforested and bunded, the top most bund should be made sufficiently large so as to intercept the water from above and pass it down safely. It will be better to make it a graded bund with a grade of two per cent and divert the water to a safe place.

Aligning will be done with an Abney level or Ghat tracer or dumpy level and stackes will be set at suitable intervals.

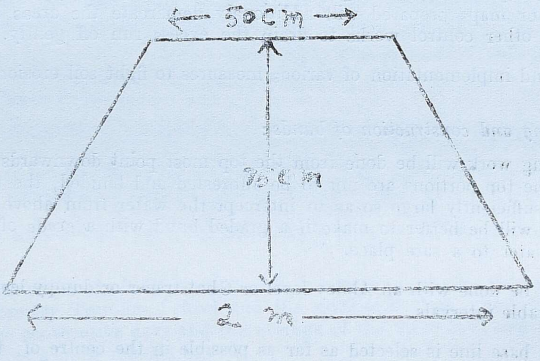
A convenient base line is selected as far as possible in the centre of the plot. A jeepable track can be taken as a base line. Both parallel and perpendicular to this base line levels are recorded by Abney level or Ghat tracer or Dumpy level at intervals of 60 metres and these are peg marked in the plot. From a cairn or a known point the level of the base line at a fixed point is found out. From this point on the base line levels of all the other points 60 metres apart are found out. Then a contour map is prepared with vertical intervals of 1 metre and these contours are marked in the field. Contour map is prepared by interpolation. After all the contours are aligned giving an appropriate vertical fall according to variations in slope they should be eased to avoid sharp curves frequent and continuous turnings. For this a deviation of up to + or—25 centimetres is permissible in vertical fall. Bunds are constructed along these contours. The width of the bund will be marked on the ground with the staked points forming the central line of the bund. Marginal bund will be constructed all along the periphery of the plot to augment soil conservation works. Burrow pits will be dug up on both sides of the bund. The length of the pit varies according to the slope. Generally the width will be

1 metre to 2 metres and depth ½ metre to facilitate check measurement. Burrow pits must run parallel to the bunds and they should be 1.5 metre away from the toe of the bund so as to prevent any slipping of the bund if the burrow pit is nearby. Great care is necessary at every stage of bunding like levelling staking, formation, providing waste weirs, etc., because failure of any bund will result in the failure of the chain of bunds lower down.

Crowler type of tractor fitted with angle dozer can be used to form bunds which will be faster and comparatively cheaper than manual labour.

769. *Ploughing methods and forming smaller bunds.*—It is necessary to direct all other operations towards maximum conservation of soil and moisture in addition to the contour bunding. All ploughings should be done strictly along the contours. While ploughing it is possible to make small bunds on the contour by running the tractor with a disc plough assembly set to one extreme side along the contour, the tractor can be made to run in the opposite direction at about 1 metre distance from the plough line to make small bunds of about 20 cente metres to 30 cente metres in height. Wherever the land is sloping uniformly it will be ideal to align the planting lines along the contour so that when tractors are used for soil working they can be made to plough along the contours.

770. *Bund spacing.*—In laying out the bunds on the ground the spacing generally adopted should be 1 metre vertical drop in 50 metres sloping distance. The bunds will be generally 50 cente metres on the top and 2 metres at the base with a vertical height of 75 cente metres as shown in the sketch.



The one metre vertical interval is only an assumption and that at this interval, contour bunds will be safe. On no account the vertical interval should be more than one metre but it can be less.

771. *Size of bunds.*—To determine the size of the bund the vertical interval, the horizontal interval and the height of the bund have to be calculated. They are determined as described below:—

Vertical Interval.

772. (a) For areas with less than 1,000 milli metres rainfall.

$VI = 6 + S \times 15$.

VI = Vertical interval.

(b) For areas over 1000 m.m. rainfall.

$$VI = 2 + S \; 4 \; 60 + S \times 7.5$$

Where S = Percentage of slope.

773. *Horizontal interval.*—The horizontal interval is obtained from the **formula:**

$$HI = \frac{VI}{\text{percentage of slope}}$$

HI = Horizontal interval

VI = Vertical interval

The height of the bund is calculated by the formula :

$$H = \frac{\sqrt{LRS}}{5} + F$$

H = Height of the bund in cm.

L = Horizontal interval.

R = Maximum rainfall in m.m. in 24 hours

S = Percentage of slope

F = Free board usually 30 cm. or less according to the local need.

774. *Contour bunds.*—Bunding is generally done for slopes less than 10 per cent. The vertical interval between two bunds will vary according to the slope. Generally the following vertical intervals are recommended.

Slope.		*Vertical interval.*
6—10 per cent	..	3 metres.
3—6 per cent	..	1·75 metres.
Less than 3 per cent		1·00 metre.

The vertical fall commonly used in this division will vary from 1.0 m to 1.75 m. since there are no areas having more than 6 per cent slope.

The cross sectional area of each contour bund will be 7500 sq. cm. with a top width of 50 cm. bottom width of 200 cm. and a height of 60 cm. Earth will be dug up from the uphill side of the bund leaving a berm of 1.75 metre width and the dug up earth will be spread out to a width of one metre on either side of the aligned contour and will be gradually heaped up to a slope of a trapezium.

The maximum permissible length of each bund is 300 m. If this length is exceeded then lateral bunds at right angles to the contour should be built at least 30 c.m. above the contour.

Jeepable paths, etc., will be formed along the contours only so that they do not form erosion hazards.

775. *Consolidation of bunds.*—The bunds should be consolidated by planting suitable species all along the bunds which are capable of growing fast to cover and hold the bund and not browsed by animals. A few species are suggested below but any other species more suitable may also be preferred :—

1	*Ipomea pescarpaea*	Cuttings 0·5 m. long
2	*Vitex negundo*	Do.
3	*Glyricidia maoulata*	Do.
4	*Euphorbia*	
5	*Arundodonax*	Slips
6	*Jatropha curcus*	Cuttings 0·5 m. long
7	*Murraya ksemigii*	Seedlings
8	*Anona squamosa*	Do.
9	*Grafted clendai*	Do.
10	*Agave*	Bulbils
11	*Aloe*	Do.
12	*Adathoda*	Cuttings
13	*Palmyrah*	Dubbling nuts
14	*Dodonea viscosa*	Seeds
15	*Tephrosia purpurea*	Kollingi

The species may be planted either mixed or pure at an interval of two metres during the planting season along with the main plantation preferably earlier if possible to prolong the effectiveness of bunds. The bunds should be inspected after the first heavy rains and weak points and breaches should be repaired immediately.

The bunds of the first year should be maintained during the second year by repairing all breaches.

776. *Prevention of cattle.*—Grazing cattle will damage the bunds and the damage will be more especially before the bunds are consolidated. Hence the area will be closed to grazing.

777. *Diversion channels.*—Diversion channels will be formed (1) to arrest the velocity of water flowing from the upper slopes of the water shed; (2) to drain off the water in such a way as to minimise damage to the loose top soil. A trench of 1.25 m. width at the top, 0.75 m. width at the bottom and 0.75 m. depth will be formed on the upper outer periphery of each year's regeneration area to channalise the flow of water and bring its velocity under control to facilitate silt deposition. Water will flow through the diversion channels into natural streams and depressions which will have waste weirs across them in bunded portions. For every 120 m. of contour bund, a breach of 0.75 m. should be provided as surplus weir to allow the excess water to flow off. Such surplus weirs should be staggered along the slope. The edges and the beds of weirs should be paved with stones.

778. *Waste weirs.*—To allow the escape of the excess water waste weirs should be provided at salient points on the bund. The superstructure of the waste weir should be strengthened by a foundation bed 30 cm. in depth and one metre in width dug in the bed of the stream or depression. The length of the foundation bed should be equal

to the width of the stream bed. A minimum width of 1.5 m. should be provided for the first eight hectare and for every subsequent 8 hectare an increase of 30 cm. should be allowed, the maximum being 2.5 m. The height of the waste weir may vary according to the height of the bund. A minimum height of 30 cm. may be allowed. If the height of the waste weir is 30 cm. the base should be about 1.2 m. For 60 cm. 2 m. and for 90 cm. 2.7 m. etc., should be allowed. The waste weir should be provided with a good packing of stones and rubbles on either side. To strengthen the sides of the waste weir a key-in is provided on either side linking it up with the bund. The extent of key-in will vary with the length of the weir lying across the stream. This variation will range from 0.6 m. for weirs upto 3 m. length to 1.2 m. for weirs up to 10 m.m length. To prevent the scouring action due to velocity an apron and one or two steppings will be provided in the down stream side of the superstructure. Each stepping will be of 25 cm. so that the top width of the waste weir will be 50 cm. in relaion to a bottom width of 1 metre. The apron or spill way will be 1 metre in width and 30 cm. in depth. A vent way will be provided in the centre of the waste weir to a length of 50 cm. and to a depth of 15 cm. The total height of the superstructure will be 1 metre and the height of each stepping will be 1/3 m. The spill way should be padded with grass sods. Masonry waste weirs are costly and serve the same purpose as grass waste weir. The cost of masonry waste weir can be reduced by putting two or more cement tubes in the centre of the weir.

779. *Construction of vegetative check down and gully plugging.*—Gullies are not common in this division. Only channel gullies are found in few places at Komapuram. Wherever there is incipient formation of a gully it should be arrested and controlled by adopting the following principles:—

(1) Retention of rainfall on water shed.

(2) Safe conveyance of run off through the gully.

Gullies should be controlled at the head to check the extension of gullies. Soil conservation works like bunding should be taken up far above the gullies to reduce the run off. The run off should be slowed down by constructing check dams in the case of channel gullies.

Vegetative check dams will be formed in gullied areas at intervals of 15 metres apart. The vegetative check dam will consist of *Agave* transplants or *Aloe* bulbils spaced at intervals of 1½ to 2 metres. The rows will be staggered. Seeds of *Cassia auriculata* and *Dodonea viscosa* will be shown and cuttings of *Poinciana elata, Jatropha curcus* and seedlings of *Murraya konigii* will also be raised. In addition brushwood will be heaped on the upper side. Wherever available stones and boulders of 25 cm. cube and above in size will be heaped in the lower side of the check dams in order to stabilise them. Masonry check dams should be built only if they are absolutely necessary and wherever the ordinary reclamatory works are considered ineffective. Check spill way or flume with grass, side spill way dams, drop inlet dams and other soil saving structures will be built wherever necessary.

SECTION 5—BAMBOO PLANTING.

780. An extent of about 6 hectare is available for planting bamboo in Vellar padugai near Ayupettai and Sathangudi villages. *Bambusa arundinacea* will be planted at an espacement of 6 m. x 6 m. two year old offsets of bamboo are suitable for planting.

SECTION 6—MAINTENANCE OF MISCELLANEOUS PLANTATIONS.

781. At Gopalasamudram (Plantation Range IV Sirkali) over an area of 17.80 ha. miscellaneous species have been raised in 1967 the details of which are furnished in the following table :—

Locality.	*Year of form.*	*Species raised.*	*Area in ha.*	*Average.*		*Stocking.*	*Remarks.*
				Girth over bark at the breast height.	*Height.*		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
						PER CENT.	
Gopalasamudram .	1967	*Eucalyptus tereticornis* (*Syn. E. hybrid*).	11·40	39·6 cm.	12·7 m.	90	.
	1967	*Inga dulce*	1·60	33·3 cm.	7·4 m.	90	
	1967	*Acacia arabica* ..	4·80	5·9 cm.	5·95 m.	90	

The details of *Eucalyptus hybrid* and *Inga dulce* raised in different localities are furnished below :—

Locality.	*Year.*	*Species.*	*Area in ha.*	*Average.*		*Stocking.*	*Remarks.*
				Girth over bark at breast height in cm.	*Height in metres.*		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
						PER CENT.	
1 Vilangudy (Range II, Kumbakonam).	1968	*Eucalyptus tereticornis.*	10·92	25	2·5	65	Will be felled in 1978.
2 Maharajapuram .	1967	*Ingadulce* ..	4·05	25	4·0	40	..
	1968	*Do.* ..	4·05	..	0·5	5	Failure.
	1968	*Do.* ..	1·42	20	2·5	65	..
	1968	*Eucalyptus tereticornis.*	18·82	22	3·0	60	..
	1968	*Eucalyptus tereticornis.*	18·82	22	3·0	60	..

Eucalyptus tereticornis (Syn. *E. hybrid*) plantations of 1967 at Gopalasamudram will be maintained and tended by clearing the bushes around them, protected and will be felled in 1976 along with *Acacia arabica* and *Inga dulce*. Advantage will be taken of the coppice regeneration of Eucalyptus.

782. *Babul plantations.*—Babul has been raised over an area of 2 ha. near Thenparungur in 1962 which is fit for exploitation. The area may be sold in public auction early in 1972 for felling so that the same is available for regeneration in time during the same year. Nursery stock of Babul seedlings should be raised in polythene containers sufficiently early so that they are available for planting in 1972. The detailed prescriptions for raising babul is furnished in section 2 Farm Forestry under Miscellaneous regulations.

783. *Mysore gum at Saliamangalam.*—*Eucalyptus hybrid* has been raised during 1972 in the failed teak areas near Saliamangalam and it is not worthwhile to retain them since the performance and growth is poor. Hence it may be converted as bamboo plantations.

SECTION 7—DIBBLING PALMYRAH ON THE PERIPHERY OF FOREST BLOCKS.

784. Palmyrah seeds will be dibbled all along the periphery of reserve lands and reserved forests (except mangrove areas) under the control of the Forest Department at 2 m. interval. The species is very hardy and is suitable for all localities irrespective of soil and is of multipurpose use. It will serve as a permanent mark for boundary identification when planted along the periphery of forest blocks. After maturity it will yield a sizable revenue also. The only difficulty is that it is slow grown and will be browsed easily by the cattle.

The palmyrah nuts usually ripen in September and each fruit has one to three seeds and it is these seeds which are sown. The ripe fruit is collected and stored in manue pits for a fortnight in order to soften the fibrous pericarp and to facilitate extraction of seed. Generally good seeds will be selected for dibbling. Light immature and insect attacked seeds should be rejected. Dibbling of Palmyrah nuts will be done during September and it will be completed by the middle of October. Light brush wood covering would be preferable after germination to prevent the same from being browsed by cattle. The work should be taken up in a systematic manner and completed in a period of five years commencing from 1972.

SECTION 8—FIRE PROTECTION.

785. Occurrence of fire is a rare phenomenon in this division. However there are stray cases of occurrence of fire here and there. The nature of fire, the extent and damage to the forest is almost negligible. The presence of ever green species such as *Manilkara hexandra, M. elengi, Memecylon umbrellatum, Madhuka latifolia, Ficus hengalensis, Tarenna asiatica, Sapindus emarginatus, Maha huxifolia* have been the limiting factor for the spread of fire in Kodiakadu reserved forests. Absence of fire in mangrove forests is chiefly due to the prevalence of slushy conditions and inaccessibility. Therefore no special and elaborate fire protection measures are suggested and prescribed except the following :--

(1) The jeepable roads, inspection paths and block lines in the cashew plantations have to be maintained properly by clearing all the rank growth which will act as effective fire protection measures in cashew plantations;

(2) Even though in all the casuarina plantations practically there is no inflammable material the inspection paths etc., will be kept clean;

(3) The boundaries of reserve forests and reserve land will be cleared of the rank growth to a width of 5 metres and will be maintained properly every year.

786. *Fire maps* :—Fire maps will be maintained at the District Forest Office on a scale of 1 cm = 1 km. separately for each range depicting all cart tracks and foot paths clearly. Every case of the fire will be serially numbered on the maps with the date of fire during the currency of the working plan period, the fires of each year being distinctly marked with different colour or symbols. Inspection of fire burnt areas to assess the damage to the forest should be done by the District Forest Officer as soon as possible after the occurance

SECTION—9—ROADS AND BUILDINGS

A-Roads :

787. There are no forest roads in this division. A proper approach road from the main road to the rest house at Point Calimere has to be constructed and matalled. Another suitable road should be formed and constructed to the proposed second rest house at Point Calimere, so that the materials for the construction of the buildings can be transported easily and subsequently the same can be used as an approach road.

B--Buildings :

788. *Residential buildings.*—The existing buildings will be maintained in a state of good repairs. Clearance of the surroundings of the buildings, white washing, painting the doors and windows and other repairs should be carried out regularly. A list of existing residential buildings has already been furnished in para 476–480.

There are no quarters for most of the staff in this division with the result they stay outside the place of work, and are forced to pay high rent for their accomodation. Hence construction of quarters for all categories of staff is prescribed during this plan period near the place of work, to enable the staff to discharge their duties more efficiently and effectively. The construction of new buildings should be taken up in a phased programme during the plan period depending upon the availability of funds and site etc. Procurement of site is a difficult problem in this division. Hence it is suggested that necessary and suitable site should be procured sufficiently early and fenced.

The construction of the following building is suggested during the currency of this working plan :- -

Serial Number	*Nameof the building*	*Number*	*Locality*	*Approxcimate. cost.*
(1)	(2)	(3)	(4)	(5)
1	Combined Peon's quarters (for peon and Jeep driver)	1	Thanjavur	15,000
2	Cymbined quarters for Forest Guards& Watcher	1	Neppugai	15,000
3	Combined quarters for Forest Guard& Watcher	1	Coleroon	15,000
4	Combined quarters for Forest Guard& Watcher	1	Aranthangi	15,000

789. *Non-residential buildings* :—The rest house at Point Calimere needs new roofing and other improvements such as flooring and plastering the walls. Water supply in the rest house which is not adequate and satisfactory at present should be improved to attract tourists. The existing Chowki gate building at Agasthiampalli to prevent poaching will be maintained in good condition by carrying out the necessary repairs as and when required.

One inspection shed with all basic necessities like furniture, cutlery and crockery, clean bath rooms with septic tank and latrine at Pattukottai is very necessary since it is very difficult to secure accommodation there and the work spots are concentrated round about Pattukottai. The construction of another rest house at Point Calimere which has already been sanctioned for accommodating the visitors and tourists should be taken up as early as possible.

790. The construction of the following new non-residential buildnigs is also recommended :—

Serial. Number. (1)	*Name of the building.* (2)	*Number.* (3)	*Locality* (4)	*Cost* (5)
1	**District Forest Office**	1	**Thanjavur**	60,000
2	**Range Offiee**	1	**Pattukottai**	15,000
3	**Range Office**	1	**Thanjavur**	15,000
4	**Inspection shed**	1	**Pattukottai**	15,000
5	**Bird Match Tower**	1	**Point Calimere**	30,000
6	**Public shelter cum Picnic shed**	1	**Point Calimere**	8,000
			Totel ..	1,43,000

C—Wells :

791. *Improvement of the well* :—There is a well near the staff quarters at Kodiakadu in a neglected condition. Water in the well should be baled out regularly every year. All the rubbish material which is found in the well will be removed and fresh sand will be added after removing the silt. Application of Pottassium permanganate to the water will be done once in 6 months. To improrve the brackish condition of water it is necessary to put few billets of Nellimaram, *Emblica officinalis* after removing the bark.

SECTION 10—BOUNDARIES, ENCROACHMENTS AND RESERVATION PROCEEDINGS ETC.

792. *Demarcation.*—Almost all the reserved forests (except Thuraikadu) and reserved lands have been demarcated on the ground by erection of granite stone pillars. Except in Talainayar reserve forests in all the other blocks stone pillars have not been numbered in accordance with the settlement maps. The stone pillars should be serially numbered in all the blocks within a period of three years during the currency of the plan. In the mangrove forests some of the boundary pillars are missing or have fallen due to erosion which should be replaced by erecting new stone pillars in their position. Some of the intermediate point require stone pillars which should be done wherever necessary. Thuraikadu reserved forests should be demarcatd on the ground.

In the padugon's large variations occur due to erosion and blocks such as Maharajapuram, Gopalasamudram, Sodiakudy should be surveyed and demarcated.

It is necessary to declare the new Korayar channel, the lagoon and Vellu voikal which pass through the Muthupet reserved forests as a right of way since many boats pass through this water way.

793. *Encroachments.*—At Pudupattinam there are about 50 to 60 families living for more than 30 years on the eastern boundary facing the Bay of Bengal even before the forest department took up the area. Hence this cannot be treated as encroachment. Sufficient area on the eastern boundary should be surveyed and demarcated on the ground for assignment to the poor fishermen families living there for the past 3 or 4 decades or so such marked area should be deleted from the forest area.

In Udayamarthandapuram there is an encroachment in over 4 hectares in which encroachers have raised coconut and they are enjoying the same for the past 2 decades. There are about 10 encroachers each having 0.5 acre to 2.0 acres. It is difficult to evict them at present. It is said that the Government has imposed a fine of Rs. 10/- per coconut tree and they have represented to the Government. Hence the matter is pending with Government for final disposal.

There are several encroachments in Senthangudy and very few at Melpannaikadu forests which should be evicted by taking suitable action as early as possible.

At Mudalaimadagu there is controversy over an area of 1.0 acre and hence the casuarina trees there have not been felled, which should be settled immediately. It was reported that an acre of private land had been included in the departmental plantation and the party objected to the felling of the planted casuarina. The mistake is said to have arisen due to change of water course of a stream which forms the southern boundary of the reserved land.

Reservation proceedings.

794 *Notification under Section 4.*—There are seven blocks which are yet to be notified under Section 4 of the Tamil Nadu Forest Act of 1882, out of which draft notification have been submitted to the Chief Conservator of Forests in respect of Keeramangalam bit I alone. Keeramangalam Bit II, Manamelkudy, Melpannaikadu, Senthengudy etc., are pending with Collector, Thanjavur. In respect of Kurumbur block the Government have deferred the proposals pending amendment to the Panchayat Act. With regard to Maharajapuram block it has to be finalised by the District Forest Officer.

795. *Notification under Section 16.*—Eighteen forest blocks have to be notified under Section 16 of the Tamil Nadu Forests Act of 1882, out of which final draft notification have been submitted to the Chief Conservator of Forests in respect of 16 blocks and further proceedings are deferred pending receipt of amendment to the Panchayat Act. A list of the 16 blocks has already been furnished in para 59 of Chapter I under Part I. In respect of Gopalasamudram block, proceedings are pending with the Collector, Thanjavur while in the case of Maravakkadu further proceedings are stayed by the Government. Necessary immediate steps should be taken to expedite the matter.

796. *Notification of compact blocks.*—There are 166 compact blocks in this division. Out of these notification under Section 26 of the Madras Forest Act of 1882, have been published in respect of 35 blocks and orders of the Board of Revenue are awaited in respect of 59 blocks and order of the Collector of Thanjavur are awaited in respect of 58 blocks. Notification in respect of 5 blocks have been transmitted to the Conservator of Forests by the Collector and submitted to the Chief Conservator of Forests. The remaining 9 blocks are not fit for notification under section 26 of the Madras Forest Act of 1882, as the areas are affected by erosion, water logging and heavy cattle damage etc. These 9 blocks have to be handed over to the Public Works Department. Section 26 notifications in respect of the remaining blocks may be issued early.

SECTION 11—MACHINERY.

797. *Tractor*.—This division is already having a " D-80 AB Buldozer " cramber type Tractor (hydraulic type) which is sufficient for use in this division. It is difficult to transport this tractor from one place to other place without a Prime Mover. Hence it is suggested chain plates should be provided for this tractor enabling to transport the same from place to place. Ploughing accessories for ploughing, rooter for uprootal of stumps, raker or tiller for soil working, etc. should be purchased and attached to the tractor for various operations.

798. *Boats.*—It is suggested that a sea sail boat which can accommodate atleast 5 persons may be purchased for the use of subordinates of Muthupet to perambulate the mangrove forests. At present the staff and inspecting officers are at the mercy of contractors for boats for inspection of mangrove forests. Supply of departmental boats will enable the officers and staff to inspect the forests more effectively and will aid in the efficient managements of mangrove forests.

799. *Sprayers.*—It is suggested that six sprayers may be purchased for use in cashew plantations of Thanjavur division for spraying pesticide and chemicals as a prophylactic control measure against pests and diseases of cashew.

SECTION 12—CONTROL RECORDS AND MAPS.

800. The control records and maps which are to be maintained in the District Forest Office have been dealt with under the various working circles. The posting and maintenance of control records and maps is a matter of vital and prime importance which should receive the personal attention of the District Forest Officer. Simple forms have been prescribed to control the implementation of the prescriptions under the working plan. All control forms will be foolscap size in loose leaf files.

801. *Control book.*—This register will show all operations actually carried out in connection with the exploitation in each felling series as per prescriptions of the working plan as well as such measures as are neither prescribed nor suggested but are carried out.

802. *Record of works.*—All works carried out under the prescriptions or recommenmendations of the working plan as well as such measures as are neither prescribed nor suggested but are carried out will be recorded in this forms.

803. *Register of deviation.*—This is a consolidated register of deviation showing every case of deviation from the prescription of the working plan, the need for deviation and the authority by whom it was sanctioned.

804. *Control maps.*—The control map will show on 1 cm. = 0.1584 km. scale the areas proposed for working every year, the areas actually worked, areas regenerated annually, if any, with the name of the species planted or sown and with the year of original planting.

805. *Control journals.*—The control journals will give a detailed account of the management of the division. The object of this journal is to secure the remarks on all aspects of administration, especially on the extent to which the objects of the working plan have been realised and the extent to which the methods prescribed have been found suitable, successful and economical and could be implemented, a record of important and interesting observations and comments arising out of the actual experience of the District Forest Officer in divisional administration and such information as is not available in the control forms and record of works. The District Forest Officer is expected to record all his suggestions for modifications and improvements in the methods of working laid down in the working plan. If it is maintained properly, it should be of great help when the plan is taken up for revision. Control journal shall be maintained separately for each working circle. The form prescribed in Appendix 'S' of the Madras Forest Department Code should be adopted and suitably expanded when necessary. In accordance with Section 50 (3) of the Code a summary of annual Revenue and Expenditure in such a form as to facilitate comparison with the financial forecast of the working plan, is to be entered in the control journal.

The control journal is a technical record and must be written up personally by the District Forest Officer at the end of each year and also before handing over charge. A copy of the entries made during the year should be submitted to the Conservator of Forests soon after the end of each financial year along with a copy of the deviation statement, the control forms and maps.

806. *Plantation and nursery journal and ledger.*—A plantation journal will be maintained for each plantation showing its location, area, a sketch of the plantation on a scale 1 cm. = 0.0792 km. the nature of previous growth, the revenue obtained by clearing of the growth, the details and cost of the plantation and details of works carried out.

Similarly a nursery journal will be maintained for each year's nursery showing its location, number and size of beds, species sown, seed origin, date of sowing, nursery technique adopted, watering regime, cost of maintenance, etc.

For every plantation and nursery raised ledgers should be maintained in detail showing the details of each operations carried out, their date and cost, etc.

Both the plantation and nursery journals and ledgers will be personally maintained by the Range Officer. Copies of these journals will be maintained at the District Forest Office.

807. The following control forms are prescribed under each working circle (*Vide* Appendix No. XXI for details of each form).

Timber plantation working circle.

1 Control of regeneration operations
2 Control of cultural operations.
3 Plantation and nursery journal and ledger, etc.
4 Control map journal.
5 Control map.

Cashew working circle.

1 Control of fellings.
2 Control of regeneration operations.
3 Control of cultural operations.
4 Plantation journal and ledger.
5 Control journal.
6 Control map.

Casuarina working circle.

1 Control of fellings.
2 Control of regeneration operations.
3 Control of cultural operations.
4 Record of works.
5 Plantation and nursery journal and ledger, etc.
6 Control journal.
7 Control map.

Mangrove working circle.

1 Control of fellings.
2 Record of yield from fellings.
3 Control journal.
4 Control map.

Minor Forest Produce working circle.

1 Control book.
2 Record of yield.
3 Record of revenue.
4 Control of regeneration operations.
5 Plantation journal and ledger.
6 Control journal.
7 Control map.

Miscellaneous regulations.

1 Control book for grazing.
2 Record of works—Miscellaneous regeneration.
3 Control journal.
4 Control map (showing area closed to grazing, open to grazing, etc.)

Common to all working circles.

1 Register of deviations.
2 Record of works.
3 Financial statement.

808. *Fire maps.*—Separate fire maps should be maintained for each range showing all cart tracks foot paths and boundaries fire traced every year as per plan prescriptions and also areas burnt by fire each year with the date, etc.

Sample forms for the control records and control journals for all the working circles are given in Appendix Nos. XX and XXI.

809. *Control map.*—The control maps to the scale of 1 cm. = 0.1584 km. will be maintained as detailed below :—

810. *A. Timber plantation working circle*—Details of area planted up along the canal and river banks, year of planting and the name of the main species raised both in the case of compact and avenue plantations will be shown on separate control maps of 1 cm = 0.1584 km. scale.

811. *B. Cashew working circle, Casuarina working circle and Minor Forest Produce working circle.*—Details of felled fuel coupes or regeneration areas such as the year of working area leased out and area actually worked, etc. will be shown on the control maps of 1 cm. = 0.1584 km. scale. Year of regeneration, area planted with species, etc., will also be indicated in the map.

812. *C. Mangrove working circle.*—The control map will show 1 cm. = 0.1584 km. scale the wooded and blank areas of the mangrove coupe, annual proposed area of felling, year of working, the areas actually worked, balance area if any, arrear coupes felled if any with the year of selling and extent and other details such as the actual course of small creeks, lagoon, etc.

CHAPTER VIII—ESTABLISMENT AND LABOUR.

SECTION I—ESTABLISHMENT.

813. The existing strength of the staff of this division has been furnished in paragraphs 235–236 of Chapter IV in Part I. At present no increase in staff is considered necessary.

814. *Dual control at Kodaikadu.*—At present the Range Officer, Pattukkottai Range is disbursing the pay and allowances of his protective staff working at Point Calimere who are virtually under the administrative control of the Range Officer, Wildlife Unit which has lead to laxity of control in the past In order to effect proper control and to increase the efficiency of administration, the possibility of placing the entire wildlife unit under the direct control of the District Forest Officer, Thanjavur may be explored.

SECTION 2—JURISDICTIONAL CHANGES.

815. The Plantain in Ronge No. III with headquarters at Tiruchirappalli will be completing planting in the regeneration areas under its control by 1971 and since no more adequate and suitable areas are available for carrying out future planting work beyond this period, this range will have to move to South Arcot district for taking up the areas along Vellar river and other canals of Chidambaram, Virudhachalam and Cuddalore taluks. The headquarters of this range may be at Vridhachalam which is a central place for all the areas of future planting. After completing planting in Virudhachalam taluk, the range can move to Chidambaram.

This range can be under the control of the Thanjavur Forest division even though it may amount to dual jurisdiction. Since Thanjavur division is having already jurisdiction up to Coleroon it is possible to have effective control over the future areas of planting in Chidambaram and Virudhachalam taluk because it is very adjacent to Coleroon and Lower Anicut respectively.

After the completion of planting work in Tiruchirappalli district the regeneration areas under the control of Plantation Range No. III with headquarters at Tiruchirappalli will be handed over to the Tiruchirappalli Forest division for further maintenance, protection and exploitation. All compact plantations in Tiruchirappalli district under the control of the District Forest Officer, Thanjavur Forest division will also be handed over to the District Forest Officer, Tiruchirappalli Forest division for further maintenance and protection.

SECTION 3—LABOUR.

816. Generally there is no difficulty during off season for recruitment of labour to carry out forest works since the regeneration areas are scattered at different localities. Scarcity of labour becomes acute particularly during the agriculture season such as ploughing, planting and harvesting chiefly due to the attractive wages and foodgrains offered by the agriculturists.

The wages paid at present in the division as per Forest schedule of rates are given below :—

	Forest Wages	*Private Wages*
	RS.	RS.
Men	2.00	3.00 Plus food
Women	1.50	2.00 etc.

CHAPTER IX—FINANCIAL FORECAST AND COST OF THE WORKING PLAN.

SECTION I—FINANCIAL FORECAST.

817. The probable revenue and expenditure in respect of each working circle during the period of the working plan as estimated and an abstract of the forecast are furnished in the following statement. Since most of the teak plantations are in the formative stage no appreciable amount of revenue can be anticipated except by way of thinning which will be meagre. Some revenue can be expected from cashew working circle since cashew plantations just started yielding and it is expected that the revenue will be appreciable after 1975 by which time the cashew crop will attain the age of appreciable production. The revenue expected by way of first and second thinning in cashew plantations will be meagre.

It is only from the casuarina working circle a substantial amount of revenue can be realised since here will be exploitation every year. Fuel from mangrove working circle and minor forest produce from minor forest produce working circle will produce some appreciable revenue. The revenue from coconut at present is negligible since the same has not yet commenced bearing of fruits. But it is expected that in another four or five years the revenue from coconut will be appreciable. The farm forestry plantations under the miscellaneous working circle will not give any revenue as they will not come for exploitation during the period of the plan.

Between forecast and actuals variation may occur due to various factors such as fluctuations of price in the market, demand for produce in the market, crop production in the case of cashew, coconut, etc., which is governed by the vagaries of climate, pests and diseases, etc.

818. The following is the financial forecast of revenue **and expenditure :—**

Serial number.	*Revenue.*			*Remarks*
	Particulars.	*Amount.*		
(1)	(2)	(3)		(4)
		RS.	P.	
I. Timber plantation working circle—				
(1)	By sale of 10,000 poles at Re. 1 per pole for 10 years at 1,000 poles per year.	10,000	00	
(2)	By sale of 100 tonnes of fuel (i.e. top ends and side branches) at Rs. 20 per tonne for 10 years at 10 tonnes per year.	2,000	00	
		12,000	00	
II. Cashew working circle—				
(1)	By sale of 2·5 lakhs Kg. of cashew nuts at Re. 1 per Kg. for 10 years at 25,000 Kg. per year.	2,50,000	00	
(2)	By first and second thinning in cashew plantations at Rs. 200 per year for 10 years.	2,000	00	
		2,52,000	00	
III. Casuarina working circle—				
(1)	By sale of 12,500 tonnes of fuel at Rs. 30 per tonne for 10 years at 1,250 tonnes per year.	3,75,000	00	
(2)	By sale of pruned side branches of casuarina 500 tonnes of fuel and 10,000 head-loads of casuarina twigs for 10 years at 50 tonnes of fuel and 1,000 head-loads per year at Rs. 20 per tonne of fuel and Rs. 0·75 per head-load of casuarina twigs.	10,000	00	
		7,500	00	
		3,92,500	00	

Serial number.	*Expenditure.*			*Remarks.*
	Particulars.	*Amount.*		
(1)	(2)	(3)		(4)
		RS	P.	
I. Timber plantation working circle—				
	(1) Formation and maintenance of plantation of teak and other timber species at Rs. 490 per ha. for 5,000 ha. at 500 ha. per annum including the nursery cost.	24,50,000	00	
	(2) Expenditure on thinning in avenue and compact plantations.	2,50,000	00	
		27,00,000	00	
II. Cashew working circle—				
	(1) Raising cashew over an area of 665 ha. at Rs. 320 per ha. and maintenance.	2,12,800	00	
	(2) Expenditure on cultural operation in old cashew areas such as thinning, soil working, cutting back the intervening jungle growth at Rs. 30 per ha. for 1375 ha. three times during the plan period.	1,23,750	00	
	(3) Application of manure over an area of 1,375 ha. at Rs. 50 per ha. for 10 years including the cost of manure.	6,87,500	00	
	(4) Application of pesticide over an area of 1,375 ha. at Rs. 30 per ha. for 10 years including the cost.	4,12,500	00	
	(5) Soil conservation works such as contour bunding and consolidation of bunds by planting suitable species and gully plugging, etc., at Rs. 100 per ha. for 1,375 ha.	1,37,500	00	
		15,74,050	00	
III. Casuarina working circle—				
	(1) Formation and maintenance of 396 ha. of casuarina plantation at the rate of 50 ha. per annum at Rs. 665 per ha. including the cost of nursery.	2,63,340	00	

Serial number.	*Revenue.*		*Remarks.*
	Particulars.	*Amount.*	
(1)	(2)	(3)	(4)
		RS. P.	
IV. Mangrove working circle—			
(1)	By sale of 3,000 tonnes of firewood at Rs. 30 per tonne for 9 years at 330 tonnes per year.	90,000 00	
	N.B.—All mangrove areas will be exploited within 9 years during the currency of the plan and hence no mangrove area will be available for extraction after 9th year.		
		90,000 00	
V. Minor forest produce working circle—			
(1)	By sale of fishery lease at Rs. 10,000 per year for 10 years (Based on the average of previous years).	1,00,000 00	
(2)	By sale of coconut usufructs at Rs. 75,000 per year from 1974 till 1980 for 7 years.	5,25,000 00	
	N.B. The yield is likely to be obtained from 1974 onwards only.		
(3)	By sale of palmyrah lease at Rs. 2,000 per sale once in 3 years for 3 sales.	6,000 00	
(4)	By sale of elandai fruits at Rs. 200 per year for 10 years (Based on the average of previous years).	2,000 00	
(5)	By sale of other items of minor forest produce at Rs. 300 per year for 10 years.	3,000 00	
		6,36,000 00	
		RS. P.	
VI. Miscellaneous regulations—			
1. *Grazing—*			
(1)	By sale of grazing permits at Rs. 2,500 per year for 10 years.	25,000 00	
(2)	*Exploitation of miscellaneous plantations.*—By sale of miscellaneous plantations of Mysore gum, babul and Kodukapulli at Rs. 100 per ha. for 60 ha.	6,000 00	
		31,000 00	

Serial number.	Expenditure.		Remarks.
	Particulars.	*Amount.*	
(1)	(2)	(3)	(4)
		RS. P.	
IV. Mangrove working circle—			
(1)	Survey and demarcation of fuel coupes at Rs. 0·25 per 20 metres (700 metres for 1 ha.) for 302 ha. over a period of 9 years.	2,600 00	
V. Minor Forest produce working circle—			
(1)	Maintenance and application of manure in coconut plantation at Rs. 320 per ha. over 48 ha. for 10 years (at 3 Kg. per tree).	1,53,600 00	
(2)	Tending the palmyrah trees once in 3 years at Rs. 500 per tending.	1,500 00	
		1,55,100 00	
VI. *Miscellaneous regulations—*			
(1)	*Grazing.*—Improvement to grazing such as repairing the tank and clearing the jungle growth on the bunds for 10 years.	1,000	
(2)	*Farm Forestry.*—Raising farm forestry plantations and maintenance of old plantations including the nursery cost of Rs. 87 per ha. for 2,000 ha.	1,74,000 00	
	N.B.—Formation of farm forestry plantations are subject to availability of area and allotment of funds.		

Seriarl number.	*Revenue.*		*Remarks.*
	Particulars.	*Amount.*	
(1)	(2)	(3)	(4)
		Rs. P.	
3. *Other items*—			
	(1) By realisation of compounding fees, collection of fines, sales of seizures etc. at Rs. 2,500 per year for 10 years.	25,000 00	
	(2) Revenue apportioned to this division from compounding fees collected by the Assistant Conservator of Forests, Special Mobile Patrol Party, at Rs. 1,000 per year for 10 years.	10,000 00	
		35,000 00	
	GRAND TOTAL	14,66,500 00	

Serial number.	*Expenditure* *Particulars.*	*Amount.*		*Remarks.*
(1)	(2)	(3)		(4)
		Rs.	P.	
(3)	*Wildlife conservation.*—Improvement to the area by proviation of water facilities, planting of furiting trees, etc.,over 10 years.	10,000	00	
(4)	*Bamboo planting.*—Planting and maintenance of bamboo over an area of 10 ha. at Rs. 250 per ha.	2,500	00	
(5)	*Exploitation of miscellaneous plantations.*—Survey and demarcation of miscellaneous plantations (Eucalyptus Inga and Acacia species) at Rs. 0·25 per 20 metres (700 metres per ha.)	480	00	
(6)	*Roads, buildings and wells.*—(*a*) Construction of approach road to Kodiakadu rest house from the railway station.—	20,000	00	
	(*b*) Maintenance of old existing buildings	2,000	00	
	(*c*) Construction of new buildings	3,60,000	00	
	(*d*) Maintenance of old wells	200	00	
(7)	*Rainguage.*—Installation of automatic raingauges at various stations at Rs. 2,000 for 8 numbers.	16,000	00	
(8)	*Machinery.*—(*a*) Purchase of 2 new boats and their maintenance at Rs. 300 per year.	10,000 3,600	00 00	
	(*b*) Sprayers for application of pesticide at Rs. 500 for 6 Numbers and their maintenance at Rs. 100 per year.	3,000 1,000	00 00	
	N.B.—When sprayers becomes unserviceable due to long use they may be replaced with new ones.			
	(*c*) Maintenance of tractors for 10 years at Rs. 3,000 per annum.	30,000	00	
	(*d*) Maintenance of motors vehicle for 10 years at Rs. 2,000 per year.	20,000	00	
	(*e*) Contingencies for 10 years at Rs. 1,000 per year ..	10,000	00	

819. The following are the detailed particulars for the cost of establishment.—

Serail number and Establishment.	*Pay and D.A.*	*T.A. and other allowances.*	*Total.*
(1)	(2)	(3)	(4)
	RS.	RS.	RS.
1 Pay of Officers for 10 years	86,400	18,000	1,04,400
2 Pay of Range Officers for 10 years ...	2,85,600	1,28,100	4,13,700
3 Pay of Ministerial staff for 10 years ..	2,94,000	1,47,600	4,41,600
4 Pay of Foresters for 10 years	5,54,400	92,400	6,46,800
5 Pay of Protective Staff for 10 years (Forest Guard, Watcher and Tanadar).	7,42,600	4,600	7,47,200
6 Pay of Menials for 10 years (Office watcher, Tapal watcher and Peons).	60,000	28,800	88,800
7 Pay of Drivers and Cleaners (Jeep and Tractor) for 10 years.	67,200	24,000	91,200
Total ..	20,90,200	4,43,500	25,33,700

WILD LIFE UNIT.

Serial number and Establishment.	*Pay and D.A.*	*T.A. and other allowances.*	*Total.*
(1)	(2)	(3)	(4)
	RS.	RS.	RS.
1 Pay of State Wild Life Officer (apportioned to 1/5th portion only) at Rs. 2,880 approximate per year for 10 years.	28,800	9,000 (apportioned to 1/5th).	37,800
2 Pay of Range Officer for 10 years at Rs. 4,800 per annum.	48,000	20,400	68,400
3 Pay of Foresters for 10 years	52,800	7,200	60,000
4 Pay of protective staff for 10 years (Forest Guard, Watcher, etc.).	60,000	7,200	67,200
5 Pay of menials for 10 years (Peon, Bungalow, Watcher, etc.).	15,000	1,800	16,800
Total ..	2,04,600	45,600	2,50,200

WILD LIFE UNIT—*cont.*

	RS.
1 Cost of establishment of Territorial Division	25,33,700
2 Cost of establishment of Wild Life Unit	2,50,200
3 Proportionate cost of Assistant Conservator of Forests, Special Mobile Patrol Party and his staff for 10 years (1/6th portion of the total) @ Rs. 6,300 approximately per year.	63,000
Grand Total ..	28,46,900

N.B.—The emoluments of the different staff are given in the above statement based on the present salary and allowances which are bound to vary in future due to the recommendation of the Pay Commission.

820. The following is an abstract statement of revenue and expenditure anticipated for the period of the plan :—

Serial number and name of the working circle. (1)	*Revenue.* RS. (2)	*Expenditure.* RS. (3)	*Deficit.* RS. (4)	*Surplus.* RS. (5)
1 Timber Plantation working circle.	12,000	27,00,000(—)	26,88,000	..
2 Cashew working circle	2,52,000	15,74,050(—)	13,22,050	..
3 Casuarina working circle ..	3,92,500	2,63,340	..	1,29,160 (+)
4 Mangrove working circle ..	90,000	2,600	..	87,400(+)
5 Minor Forest Produce working circle.	6,36,000	1,55,100	..	4,80,900 (+)
6 Miscellaneous regulations ..	31,000	6,63,780 (—)	5,97,780	..
7 Other items	35,000	..	..	..
8 Establishment	..	25,33,700(—)	25,33,700	..
9 Miscellaneous sources	..	..	..	..
10 Contingencies	..	..	..	..
	14,48,500	78,92,570	71,41,530	6,97,460

	RS.
Deficit for 10 years	64,44,070
Average deficit per year	6,44,407

The foregoing abstract of estimated revenue and expenditure does not include the proportionate charges (1/9th portion at Rs. 18,000 approximately per year) on account of the Conservator of Forests, Coimbatore Circle and his establishment. The division is working on deficit due to the large scale regeneration operations under Timber plantation and Cashew working circle moreover most of the plantations except Cashew, Cocount and Casuarina will not come for exploitation during the currency of the plan.

SECTION—2—COST OF THE WORKING PLAN.

821. The expenditure incurred on the preparation of this working plan including the share of direction charges relating to the Conservator of Forests, Development and Working Plan Circle and his establishment during the period of preparation of this plan is furnished below :—

Serial number and particulars. (1)	*Expenditure.* (2) RS.	P.	*Remarks.* (3)
1 Pay of officers	10,421	40	
2 Pay of Establishment (Temporary and permanent) ..	27,550	97	
3 Dearness allowance	32,141	40	
4 Other compensatory allowance	5,362	82	
5 Travelling allowance and fixed travelling allowance ..	12,385	14	
6 Field work	551	00	
7 Miscellaneous	5,359	65	
8 Contingencies	16,683	09	
Total ..	1,10,455	47	

Cost of working plan per ha. .. .. $\frac{1,10,455\ 47}{29,710 \text{ ha.}}$ = Rs. 3.72.

N.B.—Area of Timber plantation working circle is also included.

One Working Plan Officer in the category of Assistant Conservator of Forests, two Range Officers, six Foresters, one Junior Assistant, one Draughtsman, one Stenotypist, one Jeep Driver, four Peons and one Office watchman formed the establishment of this working plan division which was functioning with headquarters at Coimbatore.

The revision of Working Plan for the Thonjavur Forest Division was commenced on 1st July 1969 and completed on 31st October 1970.

CHAPTER—X—SUMMARY OF PRESCRIPTIONS.

CHAPTER—I—BASIC OF PROPOSALS.

Scope.—This Working Plan is for the whole of Thanjavur Forest Division.

General objects of management : 516

The objects of management are—

(i) To exploit the resources of the forests in respect of firewood and minor forest produce with due regard to sound silvicultural principles.

(ii) To rehabilitate the degraded ex-zamin forests by raising useful species.

(iii) To increase the commercial value of the forests by artificial regeneration of economic species.

(iv) To afforest the areas with casuarina to supply fuel on sustained basis.

(v) To afforest the river and canal banks with teak and other timer species to supply timber.

(vi) To conserve the forests in the interest of climate, water supply, soil conservation and agriculture.

(vii) To provide grazing facilities to the cattle.

(viii) To supply raw materials to the forest based industries.

(ix) To protect the forests against damage by biotic factors.

(x) To ensure realisation of maximum sustain financial return.

Method of treatment—

The methods of treatment proposed in each working circle and the agency of exploitation is briefly outlined.—Casuarina and mangrove forests will be exploited on area basis through the agency of contractors under clearfelling system. Minor forest produce such as cashew, coconut, palmyrah etc., will be exploited through contractoral agency.

Regeneration.—Introduction of casuarina and cashew only in suitable soil prescribed.

Grazing will be regulated by issue of permits. There will be a chapter on miscellaneous regulations for matters not covered by the different working circles.

Working circles :

Five working circles have been constituted. Their names, areas and outcome of constitution are given below :—

Serial number and name of the working circle. (1)	*Area in hectare.* (2)	*Outcome per annum.* (3)
1 Timber plantation working circle	12,124·43	Supply and provide 1,000 (poles) binned materials per year.
2 Cashew working circle	1,374·24	Exploit and market about 25 tonnes of cashewnut per year.

Serial number and name of the working circle. (1)	*Area in hactere.* (2)	*Outcome per annum.* (3)
3 Casuarina working circle	411.47	Market about 250 ton. of casuarina fuel per annum.
4 Mangrove working circle	302.67	Annually market about 50 tonnes of firewood.
5 Minor forest produce working circle ..	Ex'ire Thanjavur Forest division.	Market about 1.25 lakh coconut per year and 20 to 30 tonnes of minor forest produce.
6 Miscellaneous regulations—		
(*a*) Grazing	**Do.**	**Provide grazing 6,000 heads of cattle per annum.**

Paragraph Number.

Manure leaf working circle of the current plan by K. P. D. Rao is discontinued and the reasons are discussed. **520**

Discontinuance of collection of minor forest produce from Kodiakadu R. F. prescribed and the reasons therefor discussed. **521–522**

Period of the working plan. **523**

This working plan will be in force from 1st April 1971 to 31st March 1981 for a period of ten years. Prescriptions are made regarding the areas to be worked in the succeeding five years if there is delay in the revision of the plan.

CHAPTER—II · TIMBER PLANTATION WORKING CIRCLE.

***General constitution.*—This working circle includes all teak plantations raised including the other timber species and the areas proposed to be planted in future.** **524–525**

Division of the area.—The total area of the timber plantation working circle will be about 12124.43 ha. out of which 5295.17ha. lo already planted with teak and other timber species and an area of 6829.26 ha. will be planted in future. Details of arta in different ranges are furnished. **526**

Seven planting series are formed as below :— **527**

	(*Area in hectare.*)
1 Thanjavur series	2,626·83
2 Kumbakonam series	2,170·31
3 Tiruchirappalli series	1,090·60
4 Sirkali series	2,317·92
5 Mannargudy series	2,454·77
6 Virudhachalam series	700·00
7 Chidambaram series	764·00
Total ..	**12,124·43**

Analysis of the crop is indicated **528**

	Paragraph Number.
Method of treatment. The silvicultural system to be adopted is clearing the growth of the banks of river and canal followed by artificial regeneration.	529
Choice of species.—Teak (*Tectona grandis*) will be the main species and the reasons therefor discussed.	530
In sites not suitable for teak, other species such as *Dalbergia sissoo, Ailanthus excelsa, Salmalia malbarica, Terminalia arjuna, T. tomentosa, Albizzia lebbeck, Dalbergia lotifoli,* etc., are suggested. Planting of *Thespesia populnea* and *Calophyllum inophyllum* will be preferable towards the sea coast due to salinity.	531
Rotation.—A tentative rotation of 60 years is prescribed and reasons therefor discussed.	532
Espacement.—Spacing in Avenue plantations in 3.5 m. apart.	533
Annual planting.—Annual planting of 500 ha. or 160 or 170 km. length for the entire division consisting of five planting units is outlined.	534
Quality class.—Teak plantations of Thanjavur division correspond to All India Quality Class IV.	535
Babul plantations.—Raising of babul along canal banks in Chidambaram and Virudhachalam taluks is provided.	536
Collection of seeds.—Arrangement will be made with the State Silviculturist for supply of Teak and other seeds required. Weight of seeds, storage and germination and plant percent are given.	537
Nursery.—Details of nursery technique are given.	538–539
Sowing.—Details of sowing of different species and their pre-treatment, etc., are outlined.	540
Size of nursery.—Requirement of nursery beds for planting different species is provided.	541
Weeding.—Weeding in the nursery beds and pulling out 'wolves' advocated.	542
Preparation of stumps.—Details of technique of preparation of stumps and their size are described.	543–544
Regulation of regeneration optration, preparation of planting sites.	
A. *Survey and demarcation*	545
B. *Clearing the area.*—This will be done before May.	546
C. *Aligning and staking.*—Aligning and staking will be done in June.	547
D. *Planting.*—Technique of planting is described.	548–549
E. *Watering.* Watering technique to the seeding till second year except on rainy days is described.	550 550
F. *Replacement of casualties.*—Replacement of casualties prescribed in the first year and in second year for different species.	551
G. *Drainage.*—Draining off water during rainy season to prevent damping off is given.	552
H. ***Wells.***—Side of wells and number of wells to be dug for watering the seedlings are given.	553

Subsidiary silvicultural operations.	PARAGRAPH NUMBER.
First year tending.—Two weedings along with soil working is prescribed.	554
Cutting back.—Cutting back of damaged seedlings and multiple shoots is advocated.	555
Second year tending..—Two weedings and soil working, pruning, etc., are provided.	556
Third year.—Pruning the side branches, climber cutting and cutting back and damaged seedlings are prescribed.	557
Further maintenance of plantations	
Handing over of the Avenue plantations to the Public Works Department after 3 years is provided.	558
Thinning.—Necessity of thinning is provided.	559
Type of thinning.—Different thinning schedule is advocated for Avenue and compact plantations.	
Thinning interval.—For Avenue plantations two thinnings at the 12th and 30th year are prescribed. In the compact plantations three thinnings at the age of 9th, 18th and 30th year are advocated.	560
Thinning in Avenue plantations.—First thinning will be mechanical and will be carried out by the Range Officer, the resultant spacing and number of plants, etc., are provided. Second thinning will be improvement of felling and the reasons therefor discussed.	561
Marking rules for improvement fellings are laid down.	562
Details of operations to be carried out along with improvement fellings are furnished.	563
Number of trees to be retained and resultant spacing after thinning is provided.	564
Thinning programme.—Particulars of area to be thinned are given.	565
Thinning in compact plantations.—The first thinning at the 9th year will be mechanical. Subsequent two thinnings at the age of 19 years and 30 years will be selective thinnings.	566–567
'C' grade thinning.—Classes of trees to be removed in 'C' grade thinning are provided.	
The marking rules for thinning are laid down. Number of trees to be retained after 'C' grade thinning is outlined in tabular statement.	568
Thinning programme.—Statement regarding the details of area to be thinned is furnished.	569–571
Depots.—Procurement of sites for depots for storage of thinned produce is suggested.	572

PARAGRAPH NUMBER

Miscellaneous regulations

Reclamation of river and canal beds.—Technique of reclamation of river and canal beds with suitable species is prescribed. 573-575

Prevention of bank erosion.—Suitable measures to prevent bank erosion by planting sutable species are discussed in detail. 576-577

Plot mazdoors.—Engagement of plot mazdoors for protection, watering and other cultural operations are suggested. 578

Plantation boards.—Fixing up of plantation boards depicting year of formation, area and locality are recommended. 579

Inspection paths.—Inspection paths are not necessary since the plantations are formed in linear strips on the banks of rivers and canals. 580

Closure to grazing.—Closure the areas against grazing is difficult. Hence protection from grazing is advocated by coastal vigil and inspection. 581

Fire protection.—Keeping plantations clean of inflamable materials is advocated. 582

Control.—The control records to be maintained are indicated. 583-584

CHAPTER—III CASHEW WORKING CIRCLE

Object of management.—The object of management is to improve and increase the area under cashew to obtain maximum yield of cashewnuts and to rehabilitate the degraded ex-zamin forests. 585

General constitution.—The working circle comprises of all existing cashew plantations and fresh areas prescribed for future planting with cashew during the plan period. 586

Silviculture of cashew and floristics are described 595-596

Silvicultural system.—The silvicultural system adopted will be the clear-felling the standing growth and conversion into cashew plantations by concentrated artificial regeneration 597

Rotation.—A tentative rotation of 40 years is prescribed and reasons therefor are given 598

Espacement.—An espacement of 7m. x 7m. prescribed and the reasons therefor discussed 599-600

Regulation of yield.—The yield will be regulated by area and calculation of yield described 601

Tabular statement of felling.—Detailed statement showing the area to be planted with cashew in the different planting series during the currency of the working plan is provided 602

Regulation of preparatory works and planting regeneration ... 603

Survey and demarcation.—The site for regeneration will be surveyed in September–October in the previous year 604

Preparation of the regeneration area.—The right to clearfell and uproot one stumps will be sold in public auction in November. In the unsold coupes clearfelling an uprootal will be done departmentally 605

Lease period.—The period of lease will be for 6 months from 1st January to 30th June 606

Kumri areas.—Planting areas will be divided into convenient bits for kumri lease. The right for kumri will be leased out in open auction with a lease period of one year from July which will be renewed for 2 years annually. Kumridars will raise shallow rooted crops only. Kumridars will do one weeding and soil working around the cashew and bund in their areas 607

Character of the vegetation.—Cashew areas represent the degraded type of scrub forest which suffered maltreatment in the past 587

Division of the area.—The total area of this working circle is 1,374.24 hectares out of which 710 hectares are already under cashew. The remaining area of 664.25 hectares will be planted with cashew during the period of the plan. Particulars regarding the distribution of the area is provided in the statement.

Three planting series are formed:— ... 588–590

(1) Aranthangi series ... 437.00 hectares.
(2) Keeramangalam series ... 351.11 hectares.
(3) Gandarvacottai series ... 586.13 hectares.

Analysis of the crop.—The crip is not uniform. There is differences of growth not only from plot to plot of the same age but also in the same plot and between neighbouring plants due to difference in the soil and vigour of the individual plant. Some of the younger plantations are over congested requiring thinning whereas in few of the older plantations the areas are open needing restocking 591–592

Method of treatment.—The treatment proposed are:— ... 593

(1) Maintenance of existing cashew plantations and improving the same by restocking the failed patches with cashew.

(2) Extending the areas under cashew by planting fresh areas.

(3) Carrying out cultural operations such as thinning, soil conservation measures soil working, manuring, clearing the intervening jungle growth, climber cutting, etc.

(4) Protection of plantations against pest and diseases by timely spraying of pesticides and chemicals.

Choice of species.—Cashew (*Anacardium occidentale*) will be raised as pure crop 594

Non-kumri areas.—All the operations will be carried out departmentally if there is no demand for kumri cultivation. In non-kumri areas all operations such as clearing, uprootal, ploughing and levelling, formation of bunds, etc., will be done by tractor. Aligning and stacking at 7m. x 7m. will be done in July. Seeds may be obtained through the Research Officer, Forest Genetics Section collected from the seed production plots ... 608

Pitting.—Pits of 30 cm. x 30 cm. will be dug up in June–July and soil allowed to weather. Pits will be refilled just before dibbling of seeds ... 609

Dibbling.—Good seeds at the rate one per pit will be dibbled during July–August after the receipt of one or two rains and saucer will be formed around the pit 610

PARAGRAPH NUMBER.

Replacement to casualties.—Casualties will be replaced during the first year itself before the end of November. Fencing around the seedlings is suggested to prevent cattle and rodent damage 611

Cultural operations.—Cultural operations such as climber cutting, clearing the intervening jungle growth soil working, thinning, application of fertilisers, spraying, chemicals and pesticides, weeding and soil working, sowing of kolingi, etc., are prescribed 612

Statement showing the year of soil working year of first thinning and second thinning in different plantations during the period of the plan is provided 613-616

Soil working to a depth of 15 to 20 cm. is prescribed once in 5 years regularly in all cashew plantations 617

Thinning.—First thinning will be done in the 9th year by which not more than 25 per cent of the trees per hectare will be removde. Second thinning is suggested in the 14th year and 125 trees per hectare will be retained 618-619

Older cashew plantations.—Detailed prescriptions are laid down for the maintenance of older cashew plantations 620-626

Other regulations.

Method of exploitation.—Usufructs will be collected by contractors from plantations of over 3 years old with a lease period of 6 months from January to June. Each plantation will be treated as a separate lease unit or split up into convenient lease units. Departmental collection will be resorted to in unsold coupes only 627

Plant protection measures.—Detailed plant protection measures are suggested 628-629

Manuring.—Application of chemical fertiliser NPK mixture 9:9:9 at the rate of 1 to 2 Kg. per plant depending upon age is prescribed 630

Soil conservation measures.—Soil conservation works such as formation of contour bunds. waste weirs. check dams and gully plugs are suggested wherever necessary 631

Inspection paths.—Formation of jeepable paths are suggested ... 632

Grazing.—Closure to grazing for 5 years is prescribed including the year of formation 633

Fire protection.—Fire protection by keeping the outer periphery clear of weeds and other growth suggested 634

Fencing.—Fencing the area to ward off cattle damage is suggested ... 635

Plantation boards.—Fixing up plantation boards at salient corners depicting the area, locality and year of formtaion is provided 636

Resurvey of plots.—Resurvey to be done in Senthangudi and Neppugai coupes which are found to be incorrect. This work should be completed within first or second year of the plan 637

Control.—Sample control forms and control records to be maintained are written by the working plan officer and appended 638

CHAPTER IV—CASUARINA WORKING CIRCLE.

	PARAGRAPH NUMBER.
General constitution.—This working circle comprises of all the existing casuarina plantations and fresh areas proposed for planting with casuarina during the plan period	639
Character of vegetation.—Casuarina is largely confined to sandy places near the sea coast and padugais of Cauvery	640–641
Division of the area.—The total area of the working circle is 411.47 hectares out of which 349.47 hectares are already under casuarina and 62.00 hectares of fresh areas will be planted with casuarina. Statement showing the distribution of area are provided	642
Felling series.—The working circle is divided into two felling series, viz., Coleroon series (278.10 hectares) and Cauvery series (128.37 hectares). Statement of area and location of blocks are provided	643
Analysis of the crop.—Casuarina plantations vary in growth and stocking from one anotder not only in different plantation but also in the same plantation of the same age due to soil factor. Flood damage is considerable in the padugais of Cauvery and Coleroon rivers	644
Method of treatment.—The silvicultural system prescribed is clearfelling followed by artificial regeneration of casuarina	645
Choice of species.—*Casuarina equisetifolia* will be raised as pure crop.	
Rotation.—A rotation of 7 years is prescribed and the reasons are discussed for fixing up the above rotation	646
Espacement.—Espacement of 2.5 m. x 2.5 m. is prescribed	647
Size of annual plantation.—Annual planting programme furnished	648
Agency of exploitation.—Exploitation of casuarina coupes will be done by the contractors	649
Method of executing fellings.—Each year plantation will form the annual coupe. Clearfelling coupe will be surveyed and demarcated on the ground in September one year prior to felling. Coupes will be devided into convenient bits or strips. Coupes will be sold in public auction	650
Lease period.—The period of lease will be 6 months from December up to May of the succeeding year	651
Regulation of felling.—Fellings will be done strip by strip by the lessees. Cutting should be done to the ground level. Stumps of casuarina and other miscellaneous species will be uprooted. Felled materials will be stacked in lots of 3 m. x 1 m. x 0.6 m. or its multiples. Produce should be removed only after the inspection by the Range Officer. No charcoal burning will be allowed inside the plantation or in any forest land. The lessee should leave tree growth to a width of 20 metres along the bank of rivers and canals to prevent bank erosion. The contractor should complete all the work including the removal of produce within the lease period	652
Tabular statement of fellings.—The year of formation, locality, area in hectare and year of clearfelling of the existing casuarina plantations during the currency of the plan period are indicated in a tabular statement	653

Another statement shows the year of formation of casuarina plantations after clearfelling the area and locality etc. 653

Regulation of preparatory works and planting :

Preliminary works.—All preliminary works will be started well ahead of planting. 654–655

Collection of seeds.—Seeds will be collected from mature cones in June from trees of above five years old and will dried in the sun for three or four days. Seeds will be stored in air tight containers with ash or insecticide 656

Preparatory of nursery.—Permanent central nursery for casuarina with good watering facilities are recommended. Raised nursery beds of standard size 10 m. × 1 m. are prescribed after digging up of the soil well and raising the bed 20 cm. from the ground level. Nursery will be fenced to prevent the entry of cattle. Seeds will be sown in December or January at the rate of 50 grams per bed. The beds will be watered regularly. Control measure against pest and insects are prescribed. When casuarina seedlings are about 8 to 10 cm. in heighty they will be pricked out in transplant beds at a spacing of 5 cm × 5 cm. The transplants will be watered regularly. Seedlings will be ready for planting in July. 657

Preparatory works for planting.—Clearfelling in plantation coupes will be completed before the end of May. Debris if any will be burnt. Effective fencing will be provided. 658

Aligning and staking.—Aligning and staking should be completed by end of June at an espacement of 2.5 m × 2.5 m. 659

Pitting.—Pits of 30 cm × 30 cm × 30 cm. will be dug out at each planting point. Pitting should be completed by the end of June. 660

Planting.—Bare rooted nursery seedlings at the rate of 2 will be planted 15 cm. apart in each pit after pudding. Planting should commence in July and will be completed by the end of August. Retention of healthy and vigorously growing casuarina seedlings after pulling out the weaker one is suggested. 661

Watering.—The object of watering and factors to be considered while watering are discussed. 662

Watering regime.—Planted casuarina seedlings will be watered as per the schedule prescribed below :—

(*a*) Half a pot of water per plant per day for the first 30 days from the date of planting.

(*b*) One third pot of water per plant on alternate days till 31st December except on rainy days.

(*c*) One pot of water per plant once in 5 days for backward plants only which are less than 1 metre in height from January to June.

Increasing watering is suggested between January to June due to drought period 663

Wells.—Wells for watering at the rate of two per hectare is prescribed. Size of wells discussed. When supply of well water is not reliable hand operated filter point pumps may be used in addition to wells after examining the economics 664

PARAGRAPH NUMBER.

Replacement of casualties.—Casualties will be replaced in the year of formation then and there as they occur before North-east monsoon to achieve at full stocking as far as possible. 665

Weeding.—One weeding in October to a diameter of 1.5 m. around the plant is prescribed 666

Areas injected with *Prosopis* and *Lantana* uprootal of the same during the initial 2 or 3 years is suggested till the canopy closes … … … 687

Second year maintenance.—During the second year replacement of casualties, watering the backward plants, maintenance of wells etc. are suggested … … … … … … … 688

Pruning.—Pruning is prescribed in the fourth year. Rules regarding pruning are described in detail. The trees will be enumerated and numbered at the time of pruning. Statement showing the year of pruning in different casuarina plantations are also provided … … … … 669

Removal of dead and wind fallen trees in public auction is suggested every year … … … … … … … … 670

Ploughing to improve the area and sowing of kolingi to increase the fertility of the area are suggested in areas after first rotation … … 671

Other regulations:

(*a*) *Grazing.*—Closure to grazing for the first 5 years including the year of formation is prescribed … … … … … … 672

(*b*) *Demarcation.*—Demarcation will be done by means of plantation boards at the salient corners depicing the year of formation, area and name of the block … … … … … … … … … 673

(*c*) *Enumeration and numbering.*—After pruning, enumeration and numbering of casuarina trees will be done … … … … … 674

(*d*) *Protection.*—The existing staff should more vigilance in protection of casuarina plantations against illicit fellings and removals etc. Appointment of plot watcher for the protection of the plot will be continued … 675

(*e*) *Bank erosion.*—Soil conservation measures to consolidate the banks by planting suitable species are prescribed to protect the river banks against erosion … … … … … … … … … 676

(*f*) *Pests and diseases.*—Protective measures against pest and diseases are suggested … … … … … … … 677

(*g*) *Statistics.*—The Range Office will furnish the quantity of firewood and poles extracted by the contractor, cost of plantation etc. which will help to assess the profit and loss … … … … … … … 679

CHAPTER V — MANGROVE WORKING CIRCLE

General constitution.—The working circle comprises of the mangrove forests of Muthupet reserved forest and the unexploited area of 121.41 ha. in Tamarancottai felling series. Pudupattinam forests included in the previous plan is excluded due to paucity of growth. The mangrove forests of Talainayar, Chatram (Maravakkadu) etc. are given rest during the period of this plan … … … … … … … … … 680

Character of vegetation.—The mangrove forests confine along the sea coast between the low and high tide limits on frush alluvial deposits. They exhibit distinct zonation and special adoptations such as vivipary stilt roots and pneumatophores etc. Wooded area is limited to the fringes of lagoons and streams and forms only about 3 to 4 per cent of the total area. Alayathy (*Avicennia officinalis*) is the only predominating species useful as fuel and small timber … … … … … … … 681

PARAGRAPH NUMBER

Division of the area.—The total area of the working circle is 302.67 hectare 682

Analysis and valuation of the crop.—The entire mangrove areas have been stock mapped to assess the wooded area which works out to 3 to 4 per cent of the total area in Muthupet reserved forest. There is no homogenity in growth in mangrove species 683

Method of treatment.—The method of treatment depends on the species present, stocking, stage of succession and coppicing power of the component species. The silvicultural system adopted will be clearfelling and retaining all advance growth below 2 metres in height 684

Rotation.—A rotation of 20 years is prescribed. The reasons therefor discussed 685

Yield.—Yield will be regulated by area 686

Method of executing felling.—The annual coupe will be demarcated in accordance with the working plan map by cut-lines of 3 m. width. All creeks and lagoons and waetr ways will be plotted on the map. Trees on the outer periphery of the forest adjoining the coupe will be ring marked and serially numbered by coal tar to serve as a mark of demarcation 687–688

Each coupe will be divided into strips depending upon the area. Survey checking by the District Forest Officer. Computation of actual surveyed area and nominal area shown in working plan map 689

Agency of explotation.—The coupes will be sold annually through the agency of contractors 690

Lease period.—The voidah for working of the coupe will depend on the area of the coup and shall commence from 1st January in the case of regular coupes 691

Coups arrears.—Arrear coupe will be sold in the next year. Coupes not sold for 3 consecutive years will be withdrawn from sale. Unfelled portion at the end of voidah will be surveyed and sold in the subsequent year with the next year's coupe 692

Felling rules.—The felling rules are given. All the growth in the coupe will be felled except the reserved trees enlisted. All advance growth of Alayathy seedling 8 cm. in girth at the base and trees below 2 metres in height will not be felled. The contractor will be bound to supply light fuel to the member of Jaggery societies at the rates fixed by the District Forest Officer 693

Tobular statement of felling.—A detailed statement of the areas to be felled in sequence during this currency of the plan is given 694

Other regulations.—Reclamation of land is given in detail 695

Demarcation of felled coupes by fixing boards indicating **number of** coupe, year of working is given 696

Regulation of grazing.—The entire working circle is closed to grazing permanently and reasons therefor given 697

Record satistics.—Monthly accounts of removals of firewood and timber should be given by the contractor 698

	PARAGRAPH NUMBER.
Control maps.—Posting of control map showing the wooded and blank areas is prescribed.	699
Control.—Control records and control forms to be maintained for the working circle are indicated in appendix.	700

CHAPTER VI—MINOR FOREST PRODUCE WORKING CIRCLE.

General constitution.—This working circle covers all the reserves (except Kodiakadu reserved forests), unreserves and other areas under the control of the Forest Department.	701
Analysis of the crop.—The forests covered by this working circle are mainly scrub type and the minor forest produce occur only in small quantities.	702 702
Kinds of produce.—The different items of minor forest produce occurring in the tract are mentioned in the list.	703
Method of treatment.—Minor forest produce will be exploited through the agency of contractors except in the case of fishing **which** is sold by negotiation.	704
Details of minor forest produce.—The list of maps and important items of minor forest produce such as Cashew, Palmyrah, Elendai, Coconut and fishing to be sold individually.	705
Other items of minor forest produce.—Other items of minor forest produce will be sold as one unit for the entire division.	706
Palmyrah.—Palmyrah trees may be leased out for tapping toddy. The period of lease will be 1st January to 31st December.	707
Dead palmyrah trees to be sold in auction once in two years.	708
Measures for the improvement of existing palmyrah and coconut plantations are suggested.	709–710
Lease period and condition of lease described.	711
Improvement measures prescribed are such as clearance of jungle growth, soil working, watering, sowing of cover crop, mulching, replacement of casualties, watering, manuring, protection from pests and diseases, closure to grazing, etc.	712–722
Fishery leases.—Various fishery leases to be given on negotiation are described in detail.	723
Konnai and Avaram bark.—This will be sold once in 5 years as a separate unit for the entire division.	724
Elendai.—Elendai at Maharajapuram will be sold as a separate unit with a lease period of one year commencing from July to June of this succeeding year.	725
Other regulations.—Discretion of the District Forest Officer to split up or club units delete or add items or units as required.	726
Accounts.—Contractors should render accounts regarding collection and removals of forest produce monthly.	727
Control.—Control forms to be maintained and posted every year are indicated.	728

CHAPTER VII—MISCELLANEOUS REGULATIONS.

Secton 1—Grazing.

PARAGRAPH NUMBER.

Grazing is allowed in all reserved forests, reserved lands of the division except in areas that are closed to grazing. 729

The object of management of grazing are :—

(1) To provide adequate pasture for cattle.
(2) To limit the grazing incidence.
(3) To improve the grazing facilities.

Closure to grazing.—Permanent and temporary closured indicated.

Temporary closure.—Areas closed to grazing temporarily for silvicultural reasons are given. 730

Permanent closure.—Mangrove working circle and coconut plantations at Manamelkudy are closed to grazing permanently. 731

Regulation of grazing.—Grazing will be regulated by issue of permits. 732

Issue of grazing permits.—Grazing permits will be issued through departmental agency. 733

Grazing rates.—Grazing rates for different animals indicated. 734

Grazing year.—The grazing year is from 1st July to 30th June of the following year. 735

Grazing unit.—The entire division is one grazing unit. 736

Penning.—Penning in the forests indicated. 737

Removal of fodder grass.—Cutting and removal of fodder grass by ryots and co-operative milk societies will be permitted in the reserved forests in accordance with the orders of the Government from time to time. 738

Demarcation of closed area.—Areas closed to grazing will be indicated conspicuously by **red sign boards.** 738
739

Improvement of watering facilities.—Measures of improvement to be carried out are given. 740

Miscellaneous regulations.

Vaccination of cattle.—Inoculation of cattle grazing in Kodiakadu reserve forests is suggested to protect the wild life from cattle borne diseases. Enhancement of grazing fees in Kodiakadu reserved forests (Point Calimere Game Sanctuary) suggested. 741

Control.—The control records to be maintained are indicated. 741

Grazing map.—Grazing map on a suitable scale indicating areas closed to grazing, etc. is suggested. 741

Section 2—Farm Forestry.

Object of Farm Forestry.—To create compact forests on tank beds and village poromboke to increase the resources of fuel, small timber, fodder and green manure leaf, etc. 742

	PARAGRAPH NUMBER.
Benefits of the farm forestry schemes are indicated.	743
Details of area planted are given in tabular statement indicating the locality, spacing, species raised, etc.	744
Selection of area, annual planting and list of areas available for future planting are indicated.	745
Treatment of the area suggested.	746
Choice of species.—Different species depending upon suitability of soil and utility of the species ore given.	747
Espacement.—Spacing for babul and other miscellaneous species 3.5 m. by 3.5 m. and for cashew 7 m. by 7 m.	748
Rotation.—A tentative rotation of 15 years is fixed for Babul and other miscellaneous species and for cashew it is fixed at 40 years tentatively.	749
Felling of Cabul and Miscellaneous species.—No plantation will come for exploitation during the plan period.	750
Cashew.—Collection of cashew usufructs from 4th year of formation indicated.	751
Nursery.—Central nursery prescribed for raising planting stock. Sowing of seeds after pretreatment and watering the seedlings in the polythene containers are indicated. Size of seedlings for planting advocated.	752–753
Preparation of site.—Aligning and staking at 3.5 m. by 3.5 m. in June and pits of 30 cm. by 30 cm. by 30 cm. during June-July are indicated.	754
Planting season.—Season of planting between July to October and during December-January in submergible areas are given.	755
Planting.—Method of planting of different species are mentioned	756
Soil working.—One soil working in September to 50 cm. around the plants to a depth of 15 cm. is prescribed in the 1st year.	757
Replacement of casualties.—Beating up of casualties before the end of rainy season suggested.	758
Maintenance.—One soil working and replacement of casualties in second year advocated.	759
Protection.—Protection by engaging plot mazdoors indicated ..	760
Closure to grazing.—Closure to grazing for 5 years from the year of formation prescribed.	761
Public relations.—To ensure success and plopularity of Farm Forestry schemes public co-operation by propaganda and publicity is advocated.	762
Staff.—Staff pattern employed at present and in future is indicated	763
Map.—A key map of the proposed areas showing the location of each and sketches for the areas already planted are furnished.	764

Section 3—Wild life.

Brief note on Point Calimere Wild Life Sanctuary and future improvements to be done are indicated.	765

Section 4—Soil Conservation.

The necessity of soil conservation works in cashew working circle is justified	766–774

Measures proposed (1) Bunding along contour (2) Formation of diversion channels, construction of waste weirs, (3) Construction of vegetative check dams and gully plugging ... ...

Mapping of land for classification of slope, methods of alignment of contour bund, use of tractor to form bunds, bund spacing, size of bunds, vertical interval, horizontal internal, etc., are described in detail 766–774

Consolidation of bunds by planting suitable species such as *Agave, Vitex, Jatropha, Aloe, Dadonea* and *Kolingi*, etc. 775

Reason for prevention of cattle is indicated 776

Provision of diversion channels to drain of excess water is given ... 777

Details of construction of waste weirs are provided 778

Gully plugging and construction of vegetative check dams in gullied areas at 15 metres are suggested. They will consist of transplants of *Agave*, sowings of *Cassia auriculata, Dadonea viscosa* and cuttings of *Jatropha curcus* and *Poinciana Clata* 779

Section 5—Bamboo planting.

Planting of bamboo in Vellar padugai is suggested. *Bambusa erundinacea* will be planted at by 6m usini 2 year old off sets 780

Section 6--Maintenance of miscellaneous plantations.

Details of various miscellaneous plantation raised in different localities are provided in a tabular statement. Felling of Eucalyptus plantation with Acacia and Inga is provided 781

Felling of babul plantations at Thenperungur and regenerating the same using polythene container seedling is prescribed 782

Mysore gum at Saliamangalam to be felled and converted into bamboo plantations is provided 783

Section 7—Dibbling palmyrah on the periphery of Forest blocks.

Dibbling of palmyrah nuts along the boundary of reserve lands and served forests at 2 metres interval is suggested 784

Section 8—Fire protection.

Clearing all the rank growth on all inspection path, jeepable roads and boundaries of reserve forests and reserve land, etc., is suggested as fire protection measures. 785

Maintenance of fire maps ond fire control journal, etc., are suggested 786

Section 9—Roads and buildings.

(*a*) *Roads.*—There are no forest roads in this division. Construction and metalling of a proper approach road from the main road to the rest house at Point Calimere is suggested. 787

(*b*) *Buildings.*—The need for construction of quarters to the staff and improvements to the rest house at Point Calimere maintenance of existing buildings in a good condition are outlined. The construction of various residential and non-residential buildings for the next 10 years in a phased programme is given 788–790

PARAGRAPH NUMBER.

(*c*) *Wells.*—Maintenance of existing wells in in good condition 791

Section 10—*Encroachments and reservation proceedings, etc.*

Demarcation of reserve forests by serially numbering the stone pillars in accordance with the settlement map is given 792

Encroachments.—Eviction of encroachment and settling the disputes of encroachment is provided 793

Reservation proceedings.—There are seven blocks yet to be notified under section 4 and eighteen blocks yet to be notified under section 16 of the Madras Forest Act of 1882. Details of such blocks are given. 794–795

Notification of compact blocks.—Out o 116 compact blocks 35 blocks have been notified under section 26 of the Madras Forest Act of 1882. The balance of 122 blocks leaving 9 blocks which are fit for notification are yet to be notified under section 26. Prompt steps should be taken to expedite matters 796

Section 11—*Machinery.*

Purchase of ploughing accessories to the tractor, sprinkler set for irrigation of nursery installation of hand operated filter point pump in casuaring plantations for watering, purchase of boats to the use of subordinates to perambulate mangrove forests, purchase of sprayers for spraying pesticide and chemicals in cashew areas are outlined. 797–799

Section 12—*Control records of maps.*

Control.—Details regarding the maintenance of control book, record of works, register of deviation, control maps and control journals are given. Simple forms have been prescribed to control each major operation prescribed. Each important cultural operations will have its own smple control form. Each working circle will have record of works for minor prescriptions and a journal for felling series or plantations. Details regarding the maintenance of control book, record of works, register of deviation and control journals for each working circle are given. Control map to be maintained under each working circle showing the details of fuel coupes worked or plantations raised as against those prescribed is given. 800–805

Plantation and nursery journals and ledgers.—Details of maintenance of plantation and nursery journals and ledgers for artificial regeneration operations are furnished 806

Control forms.—Control forms to be maintained for each working circle is listed out in detail 807

Fire maps.—Maintenance of separate fire maps for each range showing details of cart tracks, foot paths, boundaries, etc., is prescribed 808

Control maps.—The control maps to be maintained under each working circle are furnished 809–812

CHAPTER VIII—ESTABLISHMENT AND LABOUR.

Section 1—*Establishment.*

Present strength of staff is adequate and hence no change is proposed 813

Dual control of Kodiakadu.—Suggestion is made to effect and exercise proper control over Point Calimere game sanctuary ... 814

Section 2—Jurisdictional changes.

PARAGRAPH NUMBER

After completion of planting in Tiruchirappalli district the headquarters of plantation III range will be shifted to Virudhachalam where large area is available for future planting. In Virudhachalam taluk the range will move to Chidambaram to tackle the future areas. Suggestion of this range to work under the District Forest Officer, Thanjavur division is provided. Handing over all the existing regeneration areas in Tiruchirappalli district under the control of the District Forest Officer, Thanjavur to the District Forest Officer, Tiruchirappalli is suggested 815

Section 3—Labour.

Generally labour is not difficult to obtain except on agricultural season, the adequacy of rates should be reviewed once in three years. 816

CHAPTER IX—FINANCIAL FORECAST AND COST OF THE WORKING PLAN.

Financial forecast.—The details of the revenue and expenditure anticipated under each 817–820 working circle and miscellaneous items, etc., during the plan period are furnished. An abstract statement of revenue and expenditure forecast for each working circle and miscellaneous item is also provided. The gross revenue anticipated for the entire period of the plan is Rs. 14,48,500 and the total expenditure is expected to be Rs. 78,92,570. The estimated average annual deficit will be about Rs. 6,44,407. Reasons for the deficit is given 817–820

Cost of the working plan.—The total cost of the preparation of the working plan is Rs. 1,10,455.47. 821

APPENDIX - I-A TEMPERATURE.

METEOROLOGICAL NORMALS.

(Based on observations from 1931 to 1960).

1. NAGAPATTINAM.

Month.	*Mean of daily Max. °C.*	*Mean of daily Min. °c.*	*Monthly total rainfall mm.*	*Extremes (Temperature)*			
				Highest °C.	*Date and year.*	LOWEST °C	*Date and year.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
January	27·7	22·8	057·2	31·7	3 1899	16·1	4 1912
February	28·7	23·5	025·2	35·6	20 1898	15·6	6 1884
March	30·3	25·1	021·5	40·0	28 1953	16·7	5 1894
April	32·5	26·8	055·1	41·7	28 1908	20·0	19 1894
May	35·5	27·4	056·0	42·8	15 1898	2·06	8 1901
June	36·6	27·0	028·8	41·7	6 1884	40·6	29 1882
July	35·3	26·3	047·7	41·7	29 1898	21·7	13 1936
August	34.4	26·0	062·0	40·6	2 1898	20·6	28 1913
September	33·7	25·7	061·8	37·8	11 1907	20·6	9 1897
October	31·4	25·0	224·0	37·2	1 1908	20·6	23 1891
November	28·9	23·9	458·2	35·0	3 1948	16·7	18 1951
December	27.7	22·8	239.0	33·9	5 1909	16·7	9 1886

2. ADIRAMAPATTINAM.

3. VEDARANYAM.

Month.	*Mean of daily.* Max. OC.	*Mean of daily.* Min. OC.	*Monthly total rainfall mm.*	*Mean of daily.* Max. OC.	*Mean of daily.* Min. OC.	*Monthly Total rainfall mm.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)
January	29·6	20·9	056.4	29·3	22·3	075
February	31·2	21·6	008·8	30·6	22·5	013.3
March	32·4	23·7	043·9	32·7	24·6	042·4
April	33·3	26·1	060·0	34·3	26·0	032·6
May	34·1	26·9	034·1	34·8	26·7	021·
June	33·7	26·3	039·1	34·1	26·3	034·8
July	33·5	25·7	062·4	34·0	25·7	038·2
August	33·4	25·2	132·3	33·8	25·1	122·2
September	33·0	25·0	108.7	33·4	24·7	174.9
October	31·6	24·3	307·2	32·1	23·9	297·5
November	29·8	22·9	201·4	30·2	22·8	300·6
December	29·1	22·0	212·3	29··3	22·6	354·0

APPENDIX-I-D—HUMIDITY.

METEOROLOGICAL NORMALS (BASED ON OBSERVATIONS FROM 1931 TO 1960)

Month.	*Nagapattinam* 0830 Ist percent	*Nagapattinam* 1730 Ist Percent.	*Adiramapattinam* 0830 Ist Percent.	*Adiramapattinam* 1730 Ist Percent.	*Vedaranyam* 0830 Ist Percent.	*Vedaranyam* 1730 Ist Percent
(1)	(2)	(3)	(4)	(5)	(6)	(7)
January	78	74	85	66	80	75
February	77	72	82	59	77	72
March	74	71	79	62	74	71
April	73	73	73	65	73	73
May	69	69	69	70	73	73
June	61	61	64	75	73	77
July	65	63	66	72	70	73
August	70	67	69	72	74	73
September	71	69	72	73	73	72
October	70	75	81	77	81	76
November	82	77	85	77	73	69
December	81	76	85	74	82	68

APPENDIX I-B

MONTHLY RAINFALL STATEMENT FROM 1955 TO 1969 AT ARANTHANGY

Year	January		February		March		April		May	
	Number of days	*Rainfall*	*Number of days*	*Rainfall*	*Number of daus*	*Rainfall*	*Number of days*	*Rainfall*	*Number of days*	*Rainfall*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
		MM		MM		MM		MM		MM
1955 ..	4	44·95	—	..	..	..	6	79·24	3	33·20
1956 ..	4	37·08	..	..	..	..	1	0·50	1	22·35
1957 ..	1	2·03	3	8·12	..	..	1	7·11	5	61·21
1958 ..	2	11·17	1	6·09	2	9·90	3	52·83	9	114·65
1959 ..	..	—	2	26·60	..	..	3	61·00	3	41·80
1960 ..	..	—	3	61·80	—	..	3	23·80	6	65·20
1961 ..	5	105·00	1	4·00	..	..	1	29·00	5	66·80
1962 ..	..	—	1	12·00	..	—	1	14·60	9	152·90
1963 ..	10	160·90	—	—	4	59·60	2	16·80	1	16·20
1964 ..	..	..	1	5·00	..	..	..	..	1	3·00
1965 ..	..	—	1	9·00	..	—	6	51·00	1	182·00
1966 ..	9	59·60	—	—	1	9·20	2	47·60	2	20·20
1967 ..	1	10·40	..	..	2	64·20	2	26·80	1	9·60
1968 ..	..	..	1	12·0	6	24·60	7	207·20	1	8·20
1969 ..	..	..	1	8·00	..	..	3	33·60	2	44·20
Total ..	29	431·13	15	152·61	15	167·50	41	651·08	50	821·41
Average ..	2	28·74	1	10·17	1	11·17	3	43·41	3	54·76

(1)—*cont*	*June*		*July*		*August*		*September.*	
	Number of days	*Rainfall*	*Number of days*	*Rainfall*	*Number of days*	*Rainfall*	*Number of days*	*Rainfall*
	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
		M M		MM		M M		M M
1955	4	54·86	5	65·27	7	67·50	7	120·39
1956	5	46·73	2	17·78	8	244·60	10	97·02
1957	6	47·50	8	93·47	4	42·67	5	86·10
1958	1	45·12	3	21·20	7	107·10	4	33·00
1959	7	184·40	4	20·80	10	86·40	5	92·80
1960	2	67·20	7	232·00	..	..	7	140·80
1961	2	33·80	5	68·60	7	82·60	7	95·40
1962	4	106·60	9	121·10	6	109·60	7	144·80
1963	5	41·60	4	68·40	8	103·40	3	65·20
1964	2	15·00	8	115·40	3	53·40	2	40·00
1965	..	..	5	63·40	11	213·60	5	90·40
1966	2	45·60	2	20·30	8	134·70	9	253·40
1967	4	52·60	5	98·40	10	166·90	6	106·00
1968	2	56·60	4	55·30	8	65·80	9	121·20
1969	6	90·20	5	34·40	9	126·20	3	35·30
Total ..	52	888·41	76	1,095·82	106	1,604·53	89	1,521·81
Average ..	3	59·23	5	73·05	6	106·97	6	106·21

Year	October		November		December		Total	
	Number of days. (20)	Rainfall. (21)	Number of days. (22)	Rainfall (23)	Number of days. (24)	Rainfall. (25)	Number of days. (26)	Rainfall. (27)
		M M		M M		M M		M M
1955	**14**	239·03	7	77·47	9	468·38	59	1,230·33
1956	14	199·13	9	231·14	6	58·42	60	954·75
1957	**12**	187·45	17	310·38	12	194·56	74	1,040·60
1958	15	205·90	7	153·60	4	46·80	58	807·86
1959	12	126·00	2	134·00	3	5·80	55	824·60
1960	5	102·20	16	454·00	4	66·00	53	1,213·60
1961	**7**	176·60	7	64·00	3	47·40	58	773·20
1962	18	339·90	8	137·80	1	5·80	64	1,145·**10**
1963	5	104·60	10	221·10	6	167·00	68	1,024·80
1964	8	115·40	6	74·30	3	100·00	31	521·50
1965	7	61·60	11	140·00	11	326·80	58	1,137·80
1966	12	320·60	5	90·60	7	74·20	52	1,076·00
1967	11	**323·80**	7	125·40	10	347·40	59	1,331·50
1968	8	153·40	11	144·00	4	**54·60**	61	908·90
1969	12	169·60	7	232·20	12	185·60	58	59·30
Total ..	160	2,831·19	130	2,589·99	95	2,194·36	852	14,949·**84**
Averag ..	10	190·11	9	168·47	6	143·48		

ADIRAMAPATTINAM.

Year.	January.		February.		March.		April.		May.	
	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
		MM		MM		MM		MM		MM
1955	3	28·50	..	..	..	..	2	42·50	4	**79.25**
1956	5	24·50	1	5·00	..	..	..	..	2	4·10
1957	..	..	1	10·00	..	..	..	..	2	7·10
1958	2	16·80	1	5·10	2	44·50	4	97·80	8	162·90
1959	2	19·80	1	78·40	..	..	2	21·20	4	71·40
1960	1	3·40	3	80·40	..	..	3	5·60	2	48·00
1961	5	173·00	1	2·20	..	..	2	44·00	2	13·30
1962	2	3·20	4	21·00	..	..	2	84·60	2	31·20
1963	9	147·80	..	..	4	11·200	4	55·60	2	124·00
1964	..	..	..	..	..	..	3	42·20	3	14·40
1965	..	..	4	19·00	2	8·80	3	27·40	3	53·60
1966	6	62·40	..	..	3	58·60	5	49·60	2	33·00
1967	2	25·60	1	4·00	3	124·60	2	11·80	2	3·40
1968	2	25·00	1	24·00	2	31·00	10	164·00	..	..
1969 ..	1	1·40	2	6·20	1	3·20	3	40·60	2	10·20
Total ..	40	594·40	20	255·30	17	382·70	95	731·90	40	655·85
Average ..	3	39·63	1	17·02	1	25·97	3	48·80	3	43·72

ADIRAMAPATTINAM—*cont.*

Year	June.		July.		August.		September.	
	Number of days.	*Rain fall.*	*Number of days.*	*Rainfall.*	*Number of. days.*	*Rainfall.*	*Number of days.*	*Rainfall.*
(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
		MM		MM		MM		mM
1955	3	20·00	2	24·50	6	88·50	8	90·10
1956	5	111·25	4	30·00	5	37·80	7	80·50
1957	5	24 25	5	65·40	5	67·00	6	130·00
1958	1	3·80	3	49·60	13	205·96	6	127·80
1959	4	45·20	3	28·80	3	43·60	6	58·80
1960	1	6·20	6	143·80	1	8·80	4	39·90
1961	6	44·00	7	63·00	3	15·00	5	88·40
1962	2	60·80	4	22·40	8	193·80	4	81·80
1963	3	16·60	1	9·80	6	103·20	5	37·40
1964	4	36·80	11	159·80	6	89·40	6	123·40
1965	5	21·60	5	79·70	14	215·00	6	62·60
1966	4	7·00	7	82·80	16	316·20	14	230·20
1967	6	107·60	7	54·80	8	64·40	7	59·40
1968	3	13·00	5	27·60	4	26·20	11	174·40
1969	3	10·20	4	43·60	12	177·60	2	22·80
Total ..	55	543·30	74	884·70	110	1,652·40	97	1,407·50
Average	4	36·22	5	58·98	7	110·16	6	93·83

COLEROON.

Year.	January.		February.		March.		April.		May.	
	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall	Number of days.	Rainfail.
(1)	(2)	(3) MM	(4)	(5) MM	(6)	(7) MM	(8)	(9)	(10)	(11) MM.
1956 ..	5	39·62	1	3·55	..	..	..	..	..	..
1957 ..	..	..	1	25·60	..	..	..	..	2	35·56
1958 ..	1	31·80	..	..	1	14·22	2	27·18	5	69·60
1959 ..	2	6·61	3	7·11	..	..	3	27·95	3	78·24
1960 ..	6	42·42	..	..	..	..	2	16·77	..	..
1961 ..	7	15·10	8	19·80	..	..	..	..	4	17·80
1962 ..	3	9·70	4	24·40	..	..	..	..	6	44·00
1963 ..	11	10·70	..	..	4	92·00	1	1·80	1	52·00
1964 ..	..	..	..	..	20	28·00	..	..	2	58·10
1965 ..	2	23·00	2	12·80	..	..	2	84·30	1	9·20
1966 ..	3	28·20	1	5·50	1	26·30	..	..	2	132·00
1967 ..	4	26·30	..	..	3	34·70	1	97·30	1	6·00
1968 ..	1	9·00	..	..	2	34·70	5	85·90	1	11·50
1969 ..	2	11·00	1	4·00	..	..	1	11·00	1	0·50
Total ..	47	553·45	21	102·76	13	229·92	17	352·20	29	467·70
Average ..	3	39·5	2	7·34	1	16·42	1	25·16	2	33·41

COLEROON—*cont.*

Year.	*June.*		*July.*		*August.*		*September.*	
	Numbers of days.	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*
(1)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
		MM.		MM.		MM.		MM.
1956	4	134·40	3	21·40	10	127·00	9	251·40
1957	3	72·80	5	164·11	8	163·40	6	63·80
1958	..	..	7	38·10	12	94·51	4	13·20
1959	3	12·19	4	4·32	10	116·61	4	8·90
1960	4	21·84	8	133·86	5	17·50	9	126·30
1961	5	19·50	7	175·30	12	291·20	8	132·90
1962	1	4·80	6	72·30	9	139·40	10	173·00
1963	3	66·20	4	24·10	10	132·80	11	135·86
1964	1	1·80	10	117·20	6	105·80	8	135·30
1965	4	49·30	7	103·10	6	137·10	7	129·81
1966	3	81·70	3	37·80	13	230·80	8	175·90
1967	3	30·00	4	36·50	11	241·60	5	65·00
1968	4	100·50	4	23·70	4	82·20	6	70·70
1969	6	41·30	6	23·00	3	85·80	8	51·00
	43	636·33	77	974·29	119	1,965·22	103	1,532·72
	3	45·45	6	69·59	9	140·41	7	109·44

ADIRAMAPATTINAM.

	October.		November.		December.		Total.	
	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.
	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
		MM.		MM.		MM.		MM.
1955	9	60·75	10	110·50	8	290·00	55	934·60
1956	13	220·75	12	290·00	7	75·00	61	948·90
1957	13	320·00	13	240·00	12	350·60	62	1,223·95
1958	13	343·90	8	218·10	1	12·00	62	1,288·20
1959	10	140·20	14	320·60	5	67·80	54	888·80
1960	7	193·50	20	513·00	3	38·60	51	1,126·20
1961	9	239·80	13	143·80	4	68·60	57	900·10
1962	18	483·40	11	235·00	3	16·20	58	1,933·40
1963	12	218·60	12	235·00	13	391·80	71	1,451·80
1964	8	97·60	11	193·60	4	63·80	56	820·80
1965	9	166·00	17	206·40	13	480·60	79	1,340·20
1966	17	474·70	7	138·60	7	14·20	88	1,593·80
1967	18	599·80	12	162·30	13	432·00	81	1,649·70
1968	10	218·40	10	218·40	6	103·90	59	979·90
1969	18	221·40	8	221·40	15	203·80	71	906·10
Total	184	3,995·80	178	3,449·70	114	2,735·90	965	17,286·45
Average ..	12	266·39	12	229·96	8	282·39	..	..

COLEROON

Year.		October.		November.		December.		Total.	
		Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.
		(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
			MM		MM.		MM.		MM
1956	.. ..	11	262·70	12	270·40	..	....	55	1,119·47
1957	.. ..	14	329·70	16	256·32	12	314·12	67	1,424·91
1958	.. ..	15	192·02	12	332·23	13	84·09	72	296·95
1959	.. ..	15	519·64	12	425·21	9	192·23	68	1,459·31
1960	.. ..	13	220·10	21	1,024·60	5	77·90	73	1,902·69
1961	.. ..	8	186·50	11	293·70	9	261·90	77	1,413·60
1962	.. ..	18	383·30	10	157·20	6	115·10	73	1,123·20
1963	.. ..	9	356·00	18	847·20	10	449·20	82	2,421·00
1964	.. ..	6	152·60	12	192·50	4	115·40	51	906·70
1965	.. ..	4	130·00	15	322·90	12	634·40	62	1,635·91
1966	.. ..	13	121·70	10	245·30	6	139·80	63	1,524·30
1967	.. ..	13	370·30	5	250·00	13	329·60	63	1,487·30
1968	.. ..	6	148·00	11	250·80	5	207·30	48	1,053·30
1969	.. ..	3	488·30	8	302·30	18	420·70	57	1,438·80
Total	..	148	4,219·76	173	5,431·26	122	3,341·94	912	19,807·44
Average ..	..	21	301·41	12	362·10	8	222·80	..	..

GRAND ANICUT.

Year.	January.		February.		March.		April.		May.	
	Number of days.	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
		M.M		MM.		MM.		MM.		MM.
1955 ..	2	28·50	..	..	..	..	6	151·25	6	133·25
1956 ..	3	25·75	..	..	..	..	2	47·25	2	8·25
1957 ..	..	..	..	..	..	..	..	..	–	..
1958 ..	..	..	..	..	4	39·80	..	..	8	106·90
1959 ..	1	6·40	..	..	..	..	..	..	2	16·00
1960 ..	..	..	1	4·00	1	8·00	1	20·00	3	61·00
1961 ..	6	61·20	..	..	..	..	1	9·00	4	13·00
1962 ..	..	..	2	15·00	1	2·00	3	16·20	4	25·70
1963 ..	7	165·70	..	..	3	33·60	2	6·40	4	50·80
1964 ..	..	..	..	..	1	4·00	1	6·00	5	50·00
1965 ..	1	4·00	3	5·60	..	..	3	20·40	2	21·60
1966 ..	1	3·00	..	..	1	2·00	4	84·00	3	16·80
1967 ..	1	20·00	..	..	3	68·60	..	..	2	88·00
1968 ..	2	48·00	..	..	4	38·00	10	214·80	3	15·00
1969 ..	..	..	..	..	..	..	1	8·40	2	8·20
Total ..	24	319·35	6	24·60	18	196·00	34	583·70	50	608·50
Average ..	2	22·81	1	1·75	1	14·00	2	38·90	3	40·57

KUMBAKONAM.

Year.	January.		February.		March.		April.		May.	
	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
		MM.		MM.		MM.		MM.		MM.
1957 ..	1	4·30	2	15·70	..	..	1	11·50	1	7·40
958 ..	1	4·30	..	..	2	49·00	3	33·00	5	128·90
1959 ..	2	18·60	2	43·40	..	..	3	22·00	2	28·80
1960 ..	4	12·50	1	2·20	..	..	3	5·20	5	46·80
1961 ..	9	154·60	1	2·00	..	..	2	7·80	5	47·00
1962 ..	..	..	2	3·90	..	..	2	12·80	6	84·80
1963 ..	8	161·50	..	..	3	72·60	3	24·00	2	53·05
1964 ..	..	..	..	..	..	..	..	..	2	42·20
1965 ..	..	..	1	5·00	..	..	3	11·80	2	57·10
1966 ..	..	..	..	..	1	2·50	2	49·00	1	30·00
1967 ..	2	25·00	..	..	..	..	1	33·00	2	53·20
1968 ..	1	1·20	..	..	1	7·00	7	146·60	2	75·00
1969 ..	1	6·00	..	..	..	..	3	51·80	4	23·20
Total ..	29	388·00	9	72·20	7	131·10	33	408·90	39	687·45
Average ..	2	29·8	1	5·6	1	10·1	3	31·5	3	52·6

GRAND ANICUT—*cont.*

Year.	*June.*		*July.*		*August.*		*September.*	
	Number of days.	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*
	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
		MM.		MM.		MM.		MM.
1955	..	..	2	11·25	3	28·00	6	118·00
1956	6	58·50	..	..	3	27·25	7	123·75
1957	2	28·50	1	18·75	2	19·50	6	41·00
1958	1	6·90	1	0·20	8	262·90	..	..
1959	3	44·00	..	..	3	67·00	4	54·40
1960	..	..	6	65·60	3	16·00	2	60·20
1961	8	58·30	1	4·20	6	56·00	12	409·10
1962	2	14·00	2	5·20	7	72·50	5	238·80
1963	2	64·40	2	76·20	3	32·30	10	122·60
1964	1	21·20	9	96·90	4	76·00	5	91·00
1965	3	24·00	3	29·80	13	227·60	6	90·20
1966	6	104·00	1	8·00	12	237·60	14	214·40
1967	5	37·80	3	22·60	9	61·60	9	127·40
1968	3	23·20	1	2·60	1	7·00	9	217·20
1969	3	52·60	..	..	6	85·70	1	5·40
Total ..	45	537·40	32	341·10	83	1,268·95	96	1,913·45
Average ..	3	35·83	2	24·36	6	24·59	6	127·56

KUMBAKONAM—*cont.*

Year.	*June.*		*July.*		*August.*		*September.*	
	Number of days.	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*
	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
		MM.	..	MM.		MM.		M.M
1957	4	52·80	5	90·40	9	73·50	9	231·80
1958	1	2·05	1	14·70	12	153·00	8	16·15
1959	5	160·40	2	6·20	8	19·80	5	19·00
1960	3	19·00	8	104·90	..	–	3	36·80
1961	5	61·80	3	24·20	5	89·90	12	253·40
1962	2	9·70	7	62·80	10	168·70	7	179·20
1963	4	17·60	6	110·70	3	31·30	7	108·40
1964	1	47·00	6	172·30	2	14·30	2	32·00
1965	2	26·40	5	28·40	13	300·40	4	65·90
1966	2	17·40	3	49·00	16	343·10	5	106·60
1967	2	34·40	2	19·00	7	133·60	4	40·80
1968	3	48·40	..		3	117·00		221·20
1969	1	46·20	..	..	7	41·00	5	64·30
Total ..	35	584·15	48	682·60	90	1,485·50	72	1,411·15
Average ..	3	42·2	4	52·5	7	114·3	6	108·6

GRAND ANICUT—*cont.*

Year.		*October.*		*November.*		*December.*		*Total.*	
		Number of days.	*Ranifall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*
		(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
			M.M.		M.M.		M.M.		M.M.
1955	..	7	279·00	3	13·00	6	182·25	41	936·50
1956	.. ..	12	557·00	6	235·75	4	59·00	45	1,142·50
1957	..	15	291·00	10	94·50	8	93·00	44	586·25
1958	.. ..	8	126·60	4	129·20	5	32·70	39	705·20
1959	.. ..	5	69·00	10	180·00	3	20·00	30	456·80
1960	.. ..	4	27·20	20	292·00	2	11·00	42	565·00
1961	.. ..	13	252·10	8	206·65	5	73·90	64	1,143·45
1962	.. ..	18	296·80	6	45·40	2	19·00	52	780·40
1963	.. ..	11	218·86	15	151·50	8	170·80	67	1,093·10
1964	.. ..	11	103·60	13	210·60	4	81·50	54	746·80
1965	.. ..	10	139·40	9	61·00	13	119·00	66	822·60
1966	.. ..	5	323·60	5	149·00	7	87·40	59	1,229·80
1967	.. ..	13	180·00	8	169·80	9	301·20	59	1,027·00
1968	.. ..	8	154·20	13	201·80	5	68·80	59	991·40
1969	.. ..	13	93·60	9	204·20	8	110·40	43	568·50
Total	..	153	3,117·90	139	2,344·40	89	1,509·95	764	12,765·30
Average	..	10	207·86	9	156·29	6	100·66	..	..

KUMBAKONAM—*cont.*

Year.	October. Number of days.	October. Rainfall.	November. Number of days.	November. Rainfall.	December. Number of days.	December. Rainfall.	Total. Number of days.	Total. Rainfall.
	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
		M.M.		M.M		M.M.		M.M.
1957	10	181·60	12	176·80	9	226·60	63	1,098·40
1958	12	150·70	9	219·70	5	27·20	54	798·70
1959	13	258·20	11	207·00	7	51·00	55	834·00
1960	10	83·40	23	616·40	5	25·50	65	953·10
1961	11	177·90	9	97·80	7	98·50	69	1,014·80
1962	22	480·40	10	201·60	3	21·60	71	1,235·50
1963	9	220·30	17	393·20	13	284·30	75	1,476·95
1964	6	132·00	7	111·40	2	122·00	28	673·40
1965	9	90·80	14	177·20	11	432·20	64	1,195·20
1966	15	432·90	8	166·80	5	120·20	58	1,317·30
1967 ..	12	284·60	7	255·80	9	294·40	41	1,178·80
1968	9	80·00	13	171·00	6	148·00	51	1015·40
1969	15	252·70	7	236·50	14	209·90	57	931·60
Total ..	153	2,825·50	147	3,031·20	96	2,061·80	751	13,723·55
Average ..	12	217·4	11	233·2	7	158·6	..	1,055·7

LOWER ANICUT.

Year (1)		January. Number of days. (2)	January. Rainfall. (3)	February. Number of days. (4)	February. Rainfall. (5)	March. Number of days. (6)	March. Rainfall. (7)	April. Number of days. (8)	April. Rainfall. (9)	May. Number of days. (10)	May. Rainfall. (11)
			M.M.		M.M.		M.M.		M.M.		M.M.
1955 ..	..	Station not maintained during 1955.									
1956 ..	..	1	35·00	1	34·75	..	..	1	22·25	1	10·10
1957 ..	..	..	..	2	20·60	..	..	..	..	2	37·00
1958 ..	..	2	10·30	..	..	1	20·40	1	17·80	6	135·40
1959 ..	..	..	..	..	..	..	..	2	19·90	6	65·50
1960 ..	..	1	8·90	..	..	..	..	1	16·80	2	69·10
1961 ..	..	6	92·50	1	6·50	..	..	..	..	2	19·00
1962 ..	..	..	..	2	15·30	..	..	1	10·20	3	98·60
1963 ..	..	7	127·80	..	..	4	88·00	1	1·80	2	41·90
1964 ..	..	..	..	1	0·60	..	..	..	..	..	..
1965 ..	..	2	17·50	2	7·00	1	0·50	4	68·70	4	31·50
1966 ..	..	2	8·00	..	..	2	9·50	..	..	5	44·80
1967 ..	..	..	..	..	..	1	6·00	..	..	..	..
1968 ..	..	1	2·00	..	..	..	..	..	..	..	..
1969 ..	..	..	..	..	..	..	..	2	40·80	3	24·60
Total	..	22	346·90	9	84·75	9	125·30	13	198·25	36	577·50
Average	..	2	24·8	1	6·1	1	8·9	1	14·2	3	14·3

MAYURAM.

Year.	January.		February.		March.		April.		May.	
	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
		M.M.		M.M.		M.M.		M.M.		M.M.
1955	4	41·00	..	..	..	..	4	108·75	6	177·50
1956	3	35·00	..	..	..	..	1	9·10	1	10·25
1957	1	4·25	1	8·10	..	..	..	..	2	30·10
1958	3	13·20	1	10·00	..	..	2	55·90	3	93·20
1959	1	13·60	1	19·00	..	..	2	33·20	2	14·30
1960	5	24·72	..	..	..	..	1	3·00	1	2·40
1961	7	190·60	2	14·00	..	..	1	20·80	2	68·20
1962	1	2·70	3	17·60	..	..	3	48·00	1	34·60
1963	8	252·00	..	..	4	87·40	1	14·00	..	..
1964	1	4·50	..	....	3	15·50	2	6·50	..	..
1965	1	6·00	..	..	2	8·50	..	..	1	3·00
1966	1	70·20	..	..	..	..	3	105·00	2	74·30
1967	..	..	..	..	2	36·20	1	54·00	1	84·00
1968	1	12·20	..	....	1	12·20	4	94·60	2	15·40
1969	..	..	..	..	..	..	..	..	2	15·40
Total ..	37	609·97	8	68·70	12	159·80	25	553·85	26	617·65
Average ..	2	40·7	1	4·6	1	10·7	2	41·2	2	41·2

LOWER ANICUT.

Year.	June.		July.		August.		September.	
	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.
	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
		M.M.		M.M.		M.M.		M.M.
1955	5	70·75	4	68·50	7	137·50	9	200·00
1956	4	73·20	8	125·00	4	36·00	9	137·00
1957	..	..	1	12·70	6	173·20	2	15·10
1958	4	83·70	1	4·60	6	231·50	4	162·50
1959	5	151·60	7	142·00	2	17·50	6	110·60
1960	2	48·30	3	39·40	7	89·50	10	181·60
1961	4	26·60	7	49·60	3	38·10	7	263·00
1962	2	22·80	8	77·70	10	175·60	5	176·40
1963	2	38·00	3	88·50	6	116·00	7	63·50
1964	4	46·57	2	26·00	16	245·20	4	58·20
1965	3	20·00	4	85·00	18	315·70	6	181·60
1966	2	15·00	..	..	10	103·20	3	36·80
1967	1	10·30	..	..	6	52·80	13	203·10
1968	1	40·20	..	..	6	40·70	5	42·30
1969	..	..	..	..	..	..	..	..
Total ..	39	647·02	48	719·00	106	1,772·50	90	1,831·60
Average ..	3	46·2	3	56·4	8	126·6	6	130·8

MAYURAM.

Year.	June.		July.		August.		September.	
	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.
	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
		M.M.		M.M.	..	M.M.	..	M.M.
1955	2	110·00	7	105·50	8	145·50	6	83·25
1956	5	120·00	4	37·25	8	100·00	10	254·00
1957	3	47·50	9	180·25	5	90·25	8	115·10
1958	..	..	4	18·30	5	97·90	2	415·80
1959	4	19·40	1	4·00	5	92·90	4	83·00
1960	3	36·00	6	137·00	1	14·00	7	103·20
1961	5	28·80	4	42·60	7	95·60	9	124·00
1962	2	31.60	6	88·80	7	198·70	6	181·60
1963	1	15·00	2	95·00	8	97·80	4	166·00
1964		18·00	1	5·25	6	75·00	5	90·00
1965	1	7·00	2	12·00	3	32·00	6	77·00
1966	1	83·40	3	45·20	19	464·30	7	80·80
1967	..	..	2	20·00		117·00	2	35·00
1968	2	41·80	..	..	5	83·40	7	129·50
1969	2	2·70	2	9·90	6	100·60	3	65·70
Total	33	561·20	55	207·05	99	1,805·15	86	1,628·95
Average ..	2	37·4	4	53·8	7	120·4	6	108·6

LOWER ANICUT—*cont.*

Year.	October.		November.		December.		Total.	
	Number of days.	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*
	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
		M.M.		M.M.		M.M.		M.M.
1955	Station not maintained during 1955.							
1956	13	197·50	15	372·75	5	90·50	60	1,239·60
1957	16	340·00	11	230·00	10	225·00	66	1,223·80
1958	11	189·00	9	244·30	6	53·40	45	873·80
1959	12	55·80	11	528·70	6	90·20	52	1,742·40
1960	9	122·50	16	797·70	4	38·80	68	1,475·25
1961	6	163·80	9	140·40	7	161·50	53	942·50
1962	18	206·90	5	82·30	5	66·30	55	856·90
1963	9	229·60	16	383·60	6	338·70	68	1,709·80
1964	6	173·00	18	205·00	10	218·90	53	903·50
1965	6	110·00	19	212·30	14	556·60	78	1,390·07
1966	15	389·10	20	789·50	6	120·50	81	1,969·70
1967	12	233·60	16	243·00	8	228·20	52	865·50
1968	4	55·00	18	238·00	7	99·00	50	660·20
1969	13	250·48	8	230·50	13	200·30	51	869·88
Total	150	3,216·08	189	4,698·05	107	2,499·90	832	16,716·85
Average ..	11	229·7	14	335·6	8	178·6	14	1,194·1

MAYURAM—*cont.*

Year.	October.		November.		December.		Total.	
	Number of days.	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*
	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
		M.M.		M.M.		M.M.		M.M.
1955	10	135·00	8	123·75	9	341·00	64	1,371·25
1956	10	137·00	17	482·25	8	145·75	67	1,330·60
1957	12	190·20	17	325·00	10	420·00	68	1,405·75
1958	8	173·90	7	236·00	8	47·40	43	791·60
1959	10	353·20	10	297·00	11	133·30	51	1,062·90
1960	8	213·20	17	1,058·80	4	48·40	53	1,640·82
1961	9	172·20	13	162·60	7	176·60	66	1,091·00
1962	21	339·20	8	199·00	5	72·00	62	1,215·00
1963	17	325·00	15	319·00	4	92·00	64	1,463·20
1964	15	340·70	16	330·00	2	30·00	53	915·45
1965	18	360·50	17	410·00	2	17·10	50	935·10
1966	16	359·20	10	191·50	5	128·00	69	1,741·90
1967	14	296·00	7	198·00	14	331·10	49	1,171·60
1968	7	106·00	11	218·40	6	181·04	46	894·54
1969	10	421·90	10	428·40	19	590·10	63	1,635·00
Total	198	4,123·30	189	4,972·70	114	2,754·39	880	18,669·71
Average ..	13	274·9	12	331·9	8	183·6	60	1,244·65

MANNARGUDI.

Year.	January.		February.		March.		April.		May.	
	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
		M.M.		M.M.		M.M.		M.M.		M.M.
1955	4	72·00	..	..	..	..	4	109·50	6	78·00
1956	5	55·50	..	..	..	..	1	4·00	1	18·50
1957	10	1·00	2	8·50	..	..	..	..	1	4·25
1958	2	13·00	..	..	1	9·00	4	34·30	6	96·50
1959	2	16·70	3	50·60	..	..	2	39·90	3	30·20
1960	5	7·60	2	70·00	1	12·40	5	54·60	4	52·00
1961	11	184·30	2	10·20	..	..	2	3·20	8	50·50
1962	2	5·40	3	16·80	1	14·20	3	19·00	6	136·20
1963	8	140·40	..	..	4	58·20	3	51·40	1	43·20
1964	..	..	..	..	..	..	..	..	..	..
1965	..	..	3	50·00	..	..	..	..	2	49·00
1966	3	56·00	..	..	..	..	1	8·00	2	37·00
1967	..	..	..	..	2	24·00	1	6·00	..	..
1968	3	18·60	1	4·00	4	17·10	9	50·00	3	18·40
1969	3	24·10	2	9·60	..	..	..	..	4	20·60
Total ..	58	599·60	18	219·70	13	135·80	35	379·90	47	633·35
Average ..	3	39.97	1	14.64	1	9.05	2	25.32	3	25.32

MUTHUPET.

Year.	January. Number of days.	January. Rainfall.	February. Number of days.	February. Rainfall.	March. Number of days.	March. Rainfall.	April. Number of days.	April. Rainfall.	May. Number of days.	May. Rainfall.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
		M.M.		M.M.		M.M.		M.M.		M.M.
1955	3	38·00	..	..	1	7·62	3	97·53	7	67·56
1956	4	95·09	..	..	..	..	2	31·24	2	7·62
1957	..	..	3	10·16	..	..	1	7·62	2	29·71
1958	3	6·35	1	5·08	6	84·83	5	42·41	10	257·30
1959	2	35·56	..	..	..	..	5	47·50	5	87·14
1960	1	9·00	3	102·00	1	10·20	5	113·20	2	13·40
1961	7	179·70	..	..	..	..	1	29·00	2	26·00
1962	1	35·00	1	14·00	1	6·00	3	74·00	3	43·80
1963	7	163·00	..	..	3	117·00	2	28·00	1	21·00
1964	..	..	1	14·00	..	..	1	2·00	2	19·30
1965	..	..	3	25·70	1	6·00	1	6·40	3	98·60
1966	6	74·20	..	..	3	23·70	2	34·50	2	43·20
1967	4	19·80	1	2·00	4	63·10	2	7·80	2	19·10
1968	3	12·90	2	19·20	3	31·70	10	160·30	1	18·00
1969	2	3·50	2	16·50	1	4·00	1	3·20	2	34·40
Total ..	43	662·10	17	208·64	21	354·15	33	684·70	46	777·13
Average ..	3	44·14	1	13·90	1	23·61	2	45·65	3	51·80

MANNARGUDI.

Year.	June.		July.		August.		September.	
	Number of days. (12)	Rainfall. (13)	Number of days. (14)	Rainfall. (15)	Number of days. (16)	Rainfall. (17)	Number of days. (18)	Rainfall. (19)
		M.M.		M.M.		M.M.		M.M.
1955	2	19·75	1	2·75	7	130·50	8	109·50
1956	4	80·80	2	14·75	5	75·25	9	235·25
1957	2	23·25	7	73·75	9	90·00	5	95·00
1958	1	14·00	3	55·60	12	238·10	6	78·20
1959	11	50·00	3	7·80	10	93·60	10	96·60
1960	4	7·80	10	125·80	2	16·00	10	59·40
1961	7	76·20	10	97·10	11	87·00	7	120·50
1962	4	22·80	6	20·80	14	167·10	5	60·40
1963	6	36·80	5	30·10	10	156·60	3	39·50
1964	3	27·00	9	84·70	3	117·00	5	123·60
1965	1	11·60	2	47·00	9	93·30	4	28·20
1966	2	43·00	1	19·00	13	447·20	11	122·80
1967	3	36·00	6	71·80	7	110·10	4	45·00
1968	..	..	3	14·80	4	94·60	10	115·70
1969	1	2·20	3	23·40	6	170·60	3	55·40
Total ..	51	450·90	71	687·85	122	2,086·95	100	1,385·35
Average ..	3	42·22	3	30·6	5	42·26	3	39·97

MUTHUPET—*cont.*

Year.	*June.*		*July.*		*August.*		*September.*	
	Number of days.	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*
	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
		M.M.		M.M.		M.M.		M.M.
1955	1	8·89	..	..	7	176·78	8	82·99
1956	6	97·53	3	19·81	7	70·61	9	82·80
1957	5	26·41	4	59·94	4	81·02	4	49·78
1958	1	157·48	5	89·20	14	313·28	4	52·00
1959	5	46·50	3	37·30	5	71·50	8	106·00
1960	1	7·60	11	127·00	1	15·00	5	71·60
1961	4	61·00	4	39·00	4	24·70	6	91·50
1962	4	104·10	2	27·80	10	321·40	4	103·00
1963	3	25·00	4	38·00	2	141·00	9	48·00
1964	2	8·00	11	119·40	7	139·20	6	113·00
1965	4	15·40	6	27·70	13	127·80	5	42·20
19	1	4·00	6	30·70	15	297·60	13	191·50
1967	6	113·60	5	43·40	8	93·30	7	76·20
1968	1	5·40	4	10·30	3	77·60	13	141·10
1969	1	4·10	4	28·40	10	146·30	3	21·50
Total ..	55	685·01	75	698·35	106	2,097·49	104	1,253·47
Average..	3	45·67	5	46·50	8	139·83	7	84·99

MANNARGUDI—*cont.*

	October.		November.		December.		Total.	
	Number of days.	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*
	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
		M.M.		M.M.		M.M.		M.M.
1955	8	138·75	8	125·00	8	341·50	56	1,127·25
1956	12	281·15	15	399·50	6	110·50	60	1,274·96
1957	11	172·75	12	200·00	10	35·25	69	703.75
1958 ..	7	156·30	8	263·00	3	25·70	53	985·60
1959	11	166·00	15	171·30	8	134·40	78	857·60
1960	11	23·20	22	520·60	4	35·80	80	1,084·20
1961	10	177·80	19	124·70	9	164·00	96	1,095·80
1962	18	517·80	3	116·20	3	27·30	68	1,123·70
1963	10	203·00	17	357·80	11	322·80	78	1,445·80
1964	7	132·80	15	103·40	5	154·40	47	832·90
1965	8	113·40	12	186·70	14	508·20	55	1,087·40
1966	11	352·50	9	197·60	6	220·90	59	1,503·00
1967	11	264·00	8	190·40	9	397·20	51	1,144·50
1968	9	149·70	13	94·20	6	141·80	65	718·90
1969	16	388·50	10	472·60	19	1,143·80	67	2,810·80
Total ..	160	3,337·65	196	3,615·06	121	3,764·05	982	17,296.16
Average ..	1	14·64	1	9·05	2	25·32	3	42·22

MUTHUPET—*cont.*.

	October.		November.		December.		Total.	
	Number of days.	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*
	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
		M.M.		M.M.		M.M.		M.M.
1955	9	106·68	10	133·85	7	419·10	56	1,119·00
1956	14	211·58	14	270·00	8	91·82	69	976·10
1957	17	329·18	20	294·64	15	717·55	75	1,606·01
1958	10	208·00	9	263·00	6	4·38	76	1,483·26
1959	13	189·70	14	314·60	5	119·00	65	1,055·60
1960	7	177·00	20	493·00	3	21·00	60	1,160·00
1961	9	370·60	10	160·21	4	150·00	51	1,090·71
1962	17	461·00	11	263·00	3	40·00	60	1,493·50
1963	14	226·00	16	413·00	12	330·00	78	1,750·00
1964	7	140·60	11	108·80	3	124·60	51	789·00
1965	11	138·20	16	241·00	14	389·40	78	1,318·40
1966	13	360·90	14	146·50	9	149·70	84	1,356·60
1967	23	404·70	15	251·90	15	478·10	92	1,564·00
1968	11	162·50	12	274·00	7	116·50	70	1,209·50
1969	15	195·50	8	257·90	17	560·50	66	1,275·80
Total	190	3,682·14	200	3,855·40	130	4,078·60	1,031	19,067·18
Average	11	258·51	12	276·36	8	288·66	..	..

NANNILAM.

Year.	January.		February.		March.		April.		May.	
	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
		M.M.		M.M.		M.M.		M.M.		M.M.
1955	4	68·33	1	3·81	..	..	4	123·43	8	177·04
1956	3	48·99	..	..	..	..	1	4·57	1	5·33
1957	..	..	2	69·99	..	..	..	..	3	19·30
1958	2	15·75	2	10·67	3	30·23	3	39·37	4	90·17
1959	1	6·00	1	24·40	..	..	3	46·60	2	5.40
1960	3	12·10	2	19·30	..	..	3	30·60	2	15·70
1961	9	244·40	..	..	..	..	..	..	4	56·00
1962	4	24·80	3	19·00	..	..	4	41·00	3	66·40
1963	7	155·60	..	..	3	89·60	2	35·50	1	42·00
1964	..	..	..	..	3	23·80	..	..	3	177·00
1965	..	..	3	33·20	1	11·00	5	148·20	2	44·00
1966	2	21·40	..	..	..	..	1	2·00	..	..
1967	2	13·00	..	..	2	58·00	1	4·40	1	12·00
1968	..	..	..	..	1	15·00	3	163·40	3	53·00
1969	..	..	1	18·20	..	..	..	..	4	36·90
Total ..	37	610·37	15	191·57	13	227·63	30	638·07	41	794·54
Average ..	2	40·00	1	12·8	1	15·2	2	42·5	3	52·3

NAGAPATTINAM.

Year.	January.		February.		March.		April.		May.	
	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
		M.M.		M.M.		M.M.		M.M.		M.M.
1955	5	69·6	2	19·0	1	0·5	3	121·2	6	145·3
1956	5	66·5	1	1·5	..	..	1	14·0	1	6·6
1957	..	..	2	10·4	..	..	..	..	4	47·8
1958	2	89·3	..	..	1	24·9	..	..	..	..
1959	1	10·0	1	0·2	..	..	3	34·5	1	7·7
1960	4	72·9	2	16·1	..	..	3	30·3	1	2·4
1961	12	232·3	1	0·8	..	..	..	..	4	31·9
1962	5	66·9	3	29·2	..	..	..	..	3	25·6
1963	11	186·0	..	..	5	22·8	4	11·2	1	0·2
1964	..	..	..	..	1	0·6	..	..	2	14·8
1965	2	12·0	6	30·8	..	..	6	92·2	2	41·2
1966	8	48·9	..	..	3	2·0	..	..	2	46·0
1967	2	90·4	..	0·1	3	47·2	1	7·2	1	7·2
1968	..	0·6	..	0·8	..	0·6	2	26·6	2	32.6
1969	4	7·0	1	13·7	..	..	4	8·7	4	41,5
Total ..	61	955·2	19	122·6	14	158·6	27	345·9	34	450·8
Average ..	4	63·6	1	8·2	1	10·6	2	23·1	2	30·1

NANNILAM.

Year.	June.		July.		August.		September.	
	Number of days. (12)	Rainfall. (13)	Number of days. (14)	Rainfall. (15)	Number of days. (16)	Rainfall. (17)	Number of days. (18)	Rainfall. (19)
		M.M.		M.M.		M.M.		M.M.
1955	2	32·00	5	134·87	8	100·84	7	132·33
1956	4	57·66	2	33·53	7	190·25	7	158·47
1957	3	23·88	6	138·43	7	111·25	7	175·00
958	..	..	2	21·00	8	51·50	3	41·00
1959	1	3·30	1	2·80	3	54·60	2	64·40
1960	2	32·00	5	55·60	..	..	4	28·80
1961	3	21·80	6	84·30	3	39·00	7	146·00
1962	..	..	4	67·40	8	164·70	7	105·00
1963	2	49·20	4	58·10	7	95·80	7	219·60
1964	2	11·00	7	186·40	3	39·50	6	96·00
1965	2	31·00	2	29·00	7	76·00	6	41·40
1966	2	20·00	4	52·20	14	232·40	6	102·00
1967	2	45·00	5	75·00	5	57·00	2	29·00
1968	1	16·00	1	15·00	5	67·00	7	175·00
1969	..	..	..	..	3	68·70	4	35·20
Total ..	26	342·84	54	953·63	88	1350·54	82	1552·20
Average ..	2	22·9	4	63·4	6	90·4	6	100·1

NAGAPATTINAM.

Year.	June.		July.		August.		September.	
	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.
	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
		M.M.		M.M.		M.M.		M.M.
1955	2	17·00	3	54·0	8	142·0	7	31·5
1956	5	51·8	3	39·9	2	98·8	4	93·7
1957	2	29·5	4	83·8	7	131·3	6	106·9
1958	1	7·3	3	43·2	5	47·0	2	15·8
1959	2	26·3	1	3·0	1	34·4	..	..
1960	4	93·8	9	243·6	..	∞	6	107·1
1961	6	32·6	8	64·4	5	9·3	8	64·4
1962	1	21·6	4	18·6	4	85·2	6	141·0
1963	3	51·3	6	18·1	10	175·0	5	85·6
1964	..	..	12	120·1	8	17·0	4	89·3
1965	3	37·8	3	33·2	11	82·3	5	36·6
1966	..	..	4	52·6	13	278·1	11	77·0
1967	3	25·1	4	31·2	8	134·2	5	41·0
1968	1	3·6	1	1·9	4	57·9	6	153·0
1969	3	1·7	4	18·0	7	20·3	3	66·0
Total ..	36	399·4	69	825·6	93	1,307·8	78	1,099·5
Average ..	2	26·6	5	55·0	6	87·2	5	73·3

NANNILAM.

Year.	October.		November.		December.		Total.	
	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.
	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
		M.M.		M.M.		M.M.		M.M.
1955	7	127·50	8	113·54	7	306·58	57	1,319·27
1956	12	116·59	16	405·13	10	149·60	63	1,200·12
1957	12	219·71	16	349·00	12	426·97	68	1,526·53
1958	13	185·00	8	280·40	7	32·30	55	802·39
1959	14	249·20	13	349·40	8	105·60	49	911·70
1960	11	109·10	19	920·10	3	50·20	54	1,314·50
1961	10	131·20	11	124·50	7	228·60	60	1,074·10
1962	19	341·60	10	239·70	7	69·50	69	1,137·10
1963	8	214·20	16	601·40	10	395·80	67	1,956·80
1964	4	57·60	7	169·80	2	150·00	37	871·10
1965	5	77·80	14	195·30	12	181·30	59	1,068·20
1966	12	503·40	5	153·00	6	156·30	52	1,242·70
1967	16	346·50	8	215·40	9	113·10	53	988·40
1968	6	182·00	9	188·00	6	96·40	42	970·80
1969	12	204·60	9	432·20	24	596·20	57	1,391·30
Total	161	3,107·00	169	4,730·17	130	3,276·45	842	17,775·01
Average ..	12	207·1	11	315·3	9	218·4	..	1,185·0

NAGAPATTINAM.

Year.	October.		November.		December.		Total.	
	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.
	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
		M.M.		M.M.		M.M.		M.M.
1955	7	231·1	10	252·0	5	237·2	59	1,370·4
1956	9	188·5	17	475·7	7	172·6	55	1,216·6
1957	14	345·7	18	397·0	14	578·9	71	1,731·3
1958	6	122·0	9	464·3	10	75·6	39	889·4
1959	13	45·7	7	600·0	5	168·8	35	930·6
1960	19	343·1	19	853·0	6	117·2	73	1,880·0
1961	9	113·3	16	163·9	10	255·9	79	968·8
1962	24	417·9	14	233·2	5	66·7	69	1,105·9
1963	9	349·3	18	789·5	14	773·7	86	2,522·7
1964	5	57·1	16	242·0	6	85·1	54	626·0
1965	13	113·8	18	226·4	14	512·0	83	1,219·1
1966	17	353·0	13	146·9	9	257·2	80	1,256·2
1967	12	230·4	11	334·7	14	702·6	64	1,651·3
1968	4	73·5	10	156·6	5	158·7	35	666·4
1969	21	356·7	10	529·0	15	352·0	76	1,362·2
Total	172	4,041·1	206	5,864·2	130	4,528·2	898	19,396·9
Average	11	269·2	14	380·9	9	301·9	62	1,283·1

PATTUKOTTAI.

Year.	January.		February.		March.		April.		May.	
	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
		M.M.		M.M.		M.M.		M.M.		M.M.
1955	4	94·49	1	7·11	..	..	6	8·52	6	68·33
1956	4	74·42	1	2·54	..	..	2	11·94	1	9·90
1957	..	..	3	28·96	1	19·70	..	..	2	55·63
1958	3	22·41	1	5·58	4	19·45	6	38·86	11	88·90
1959	2	24·40	2	2·90	..	..	2	29·60	6	146·60
1960	2	6·20	3	67·60	1	1·80	5	174·40	3	68·40
1961	7	164·40	1	3·80	..	..	1	20·20	5	45·20
1962	2	23·40	2	22·00	1	35·00	1	16·00	5	78·20
1963	8	47·60	1	16·00	4	57·00	2	9·00	1	26·00
1964	..	..	..	..	1	3·00	1	8·00	2	27·00
1965	..	..	3	14·20	3	139·00	3	110·00	2	30·40
1966	4	40·10	..	..	1	12·00	3	49·60	1	41·50
1967	3	46·20	1	10·00	3	104·00	1	3·00	1	2·10
1968	1	16·00	1	16·10	5	48·30	8	136·90	..	..
1969	..	..	1	14·20	..	..	2	37·40	1	160·40
Total ..	40	659·62	21	204·99	24	431·85	43	620·42	47	698·56
Average ..	2	48·97	1	13·67	2	28·79	3	41·36	3	46·5 7

SIRKALI.

Year.	January		February.		March		April.		May.	
	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.
(1)	(2)	(3) M.M.	(4)	(5) M.M.	(6)	(7) M.M.	(8)	(9) M.M.	(10)	(11) M.M.
1955	5	35·50	..	..	..	..	5	50·80	8	289·05
1956	4	38·35	..	..	..	..	1	8·90	1	6·10
1957	1	2·00	2	35·05	..	..	..	..	2	32·0
1958	2	19·00	1	24·40	1	10·30	1	42·50	3	74·20
1959	..	..	3	13·20	..	..	1	0·10	2	18·20
1960	4	64·00	..	..	..	..	1	0·20	2	50·00
1961	7	126·00	1	6·00	..	..	..	..	3	32·00
1962	1	10·00	2	8·00	..	..	1	5·00	5	41·00
1963	10	250·00	..	..	4	93·60	..	..	1	16·00
1964	..	..	..	..	1	4·00	..	..	1	6·00
1965	2	5·60	2	7·80	..	..	3	12·40	2	9·60
1966	1	16·00	1	3·00	2	44·00	1	10·00	2	104·05
1967	3	24·30	..	..	1	12·20	1	90·00	2	20·00
1968	1	16·30	1	0·20	1	12·80	4	126·00	2	13·20
1969	2	87·0	1	4·50	..	..	1	9·00	..	..
Total ..	43	605·75	14	101·95	10	174·90	20	354·90	36	711·40
Average ..	3	40·4	1	6·8	1	11·7	1	23·7	2	46·8

PATTUKOTTAI.

Year.	June.		July.		August.		September.	
	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.
	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
		M.M.		M.M.		M.M.		M.M.
1955	3	31·50	5	12·19	9	147·57	9	15·76
1956	6	119·38	2	21·34	8	113·03	10	219·46
1957	6	68·58	8	60·71	5	35·81	8	114·55
1958	1	19·30	4	53·10	14	210·10	3	8·40
1959	7	39·40	2	24·80	4	35·80	8	120·20
1960	1	4·00	5	102·40	4	36·20	6	82·70
1961	8	82·50	6	59·40	5	122·90	6	45·00
1962	3	7·30	5	55·00	7	130·70	5	79·40
1963	2	18·00	2	57·00	12	182·20	5	77·60
1964	4	53·00	8	164·50	3	66·00	7	124·50
1965	1	14·20	4	41·60	10	170·80	6	80·70
1966	2	31·30	2	14·30	13	219·50	11	217·20
1967	4	50·40	4	49·90	10	131·90	6	76·60
1968	1	8·00	5	52·00	3	40·80	13	218·10
1969	1	6·00	2	16·20	8	173·00	2	15·60
Total	50	545·56	64	784·44	115	1,816·31	100	1,575·77
Average	3	36·39	4	52·30	8	121·09	7	111·44

PATTUKOTTAI—*cont.*

Year.	June.		July.		August.		September.	
	Number of days. (20)	*Rainfall.* (21)	*Number of days.* (22)	*Rainfall.* (23)	*Number of days.* (24)	*Rainfall.* (25)	*Number of days.* (26)	*Rainfall.* (27)
1955	2	10·15	6	73·70	11	164·30	6	73·15
1956	8	104·40	5	17·80	8	157·30	10	210·30
1957	8	96·00	6	138·90	4	65·80	6	8130
1958	..	..	5	47·00	7	121·40	..	..
1959	3	15·00	..	..	4	44·20	2	82·00
1960	3	25·80	5	132·00	3	21·00	9	128·00
1961	4	18·00	6	72·00	14	247·00	5	69·00
1962	2	8·00	8	37·00	8	88·00	8	188·00
1963	4	76·00	3	61·00	9	79·20	7	136·80
1964	1	36·00	4	60·00	4	51·20	6	122·00
1965	3	58·80	3	32·80	8	197·60	3	63·20
1966	1	11·80	3	47·60	12	341·00	7	119·45
1967	1	2·00	3	48·05	14	248·40	3	93·20
1968	1	0·30	..	..	4	137·00	6	104·40
1969	..	..	3	21·00	5	58·00	3	68·00
Total	41	463·05	60	794·35	115	2,821·30	81	1,538·80
Average	3	30·9	4	52·9	8	134·8	5	102·7

PATTUKOTTAI—*cont.*

Year.	*October.*		*November.*		*December.*		*Total.*	
	Number of days.	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*
	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
		M.M.		M.M.		M.M.		M.M.
1955	12	199·39	11	151·13	9	469·39	75	1,357·38
1956	15	186·18	11	272·54	6	45·97	66	1,076·70
1957	15	213·36	18	268·99	17	479·30	83	1,338·59
1958	9	135·30	12	212·60	4	15·60	72	829·20
1959	9	202·20	14	197·30	6	137·00	62	953·20
1960	8	107·80	22	462·10	5	34·00	65	1,147·60
1961	9	303·70	12	116·80	6	86·00	64	1,049·90
1962	17	390·20	6	158·00	3	19·00	57	1,038·20
1963	9	144·40	14	286·30	9	356·20	69	1,371·30
1964	5	122·00	6	70·20	3	74·30	42	712·50
1965	12	109·90	16	160·30	11	464·40	75	1'236·50
1966	13	553·90	13	195·80	8	137·20	71	1,512·40
1967	14	283·70	11	247·20	12	457·00	70	1,462·00
1968	9	145·60	12	175·40	7	88·60	65	948·80
1969	12	238·20	12	254·00	18	436·00	59	1,201·00
Total ..	168	3,335·83	190	3,258·66	124	3,299·96	995	17,232·27
Average ..	11	221·26	12	214·62	8	204·57		

SIRKALI.

	October.		November.		December.		Total.	
	Number of days.	Rainfll.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.
	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
		M.M.		M.M.		M.M.		M.M.
1955	11	255·30	9	141·50	8	213·12	71	1,306·55
1956	9	155·70	15	461·30	10	158·75	71	1,312·80
1957	16	286·00	19	333·75	12	335·30	76	1,406·10
1958	11	202·80	8	253·20	4	59·40	43	854·00
1959	13	343·90	14	368·00	8	167·00	50	1,052·20
1960	12	198·50	19	1266·30	5	59·50	63	1,941·30
1961	9	92·00	12	292·00	7	295·00	68	1,249·00
1962	13	424·00	11	184·00	6	99·00	75	1,092·00
1963	8	315·00	18	611·50	5	494·00	69	2,133·10
1964	4	76·00	9	207·00	2	140·20	42	702·40
1965	4	175·00	12	267·00	11	598·00	53	1,428·00
1966	10	339·05	7	229·70	5	144·00	52	1,409·65
1967	16	457·40	9	355·00	11	343·10	63	1,693·65
1968	6	47·80	12	239·50	5	128·50	43	824·00
1969	14	505·00	7	338·00	19	436·50	55	1,448·70
Total ..	166	3,873·65	181	5,547·75	118	3,671·35	864	19,859·65
Average ..	11	252·2	12	369·8	8	244·8		1,323·9

THIRUVARUR.

Year.	January.		February.		March.		April.		May.	
	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	9)	(10)	(11)
		M.M.		M.M.		M.M.		M.M.		M.M.
1955 ..	3	35·6	1	14·00	..	..	5	61·7	7	202·0
1956 ..	3	50·5	..	0·8	..	..	1	11·9	..	..
1957 ..	..	..	1	20·3	..	..	..	..	1	13·7
1958 ..	1	5·9	..	..	2	44·2	2	25·5	2	25·5
1959 ..	2	15·6	2	32·0	..	..	3	97·0	2	17·9
1960 ..	2	24·8	2	14·0	..	..	3	25·5	2	24·6
1961 ..	10	222·0	1	4·2	..	..	1	2·2	3	34·4
1962 ..	2	30·8	1	2·6	..	..	3	42·8	4	79·6
1963 ..	5	177·8	..	..	4	108·0	1	15·4	1	16·8
1964 ..	1	1·0	..	..	2	0·5	..	..	3	74·4
1965 ..	..	..	2	26·0	..	..	6	130·0	3	73·2
1966 ..	4	18·0	..	..	1	0·2	1	1·0	2	29·0
1967 ..	2	17·4	..	..	3	38·0	1	67·6	1	5·2
1968 ..	1	5·6	1	1·0	1	8·0	6	125·4	2	21·0
1969 ..	2	11·7	1	5·2	..	..	1	1·0	4	110·3
Tota ..	38	620·7	12	120·1	13	198·9	34	607·0	37	727·6
Average ..	3	41·4	1	8·0	1	13·3	2	40·5	2	48·4

THANJAVUR.

Year.	January.		February.		March.		April.		May.	
	Number of days.	Rainfall.	Number days.	Rainfall	Number of days.	Rain fall	Number of days.	Rainfall.	Number of days.	Rainfall.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
		M.M.		MM		MM		MM		MM
1955 ..	4	51·6	1	4·3	1	2·3	5	45·7	6	100·8
1956 ..	1	22·4	1	2·2	..	..	1	57·2	2	103·4
1957 ..	..	..	2	8·4	..	..	..	..	3	17·0
1958 ..	1	9·7	..	..	2	35·3	2	26·2	10	203·4
1959 ..	2	21·4	2	24·8	..	..	3	50·4	1	10·0
1960 ..	1	7·0	2	31·0	..	..	2	59·0	4	31·9
1961 ..	10	120·0	..	..	..	..	2	29·0	6	49·7
1962 ..	..	..	..	..	1	21·0	..	..	3	63·6
1963 ..	7	192·8	1	8·6	4	54·2	6	71·6	2	19·2
1964 ..	..	..	..	..	1	6·2	..	..	4	11·0
1965 ..	..	..	2	4·6	..	..	6	90·7	2	63·5
1966 ..	4	32·7	..	..	2	38·5	5	29·7	3	32·5
1967 ..	..	..	..	..	2	14·4	..	..	..	..
1968 ..	1	6·1	..	..	1	13·9	8	115·[illegible]	2	22·3
1969 ..	..	..	..	..	..	..	..	..	2	22·3
Total ..	31	463·7	11	83·9	14	185·8	40	575·2	50	760·6
Average ..	2	30·9	1	5·6	1	12·4	3	38·3	3	51·3

THIRUVARUR.

	June.		July.		August.		September.	
	Number of days. (12)	Rainfall. (13)	Number of days. (14)	Rainfall. (15)	Number of days. (16)	Rainfall. (17)	Number of days. (18)	Rainfall. (19)
		M.M.		M.M.		M.M.		M.M.
1955	..	..	3	31·5	6	79·8	8	101·6
1956	6	43·9	2	17·5	4	58·9	7	190·5
1957	2	12·7	5	145·3	3	10·1	4	147·1
1958	..	..	4	45·8	8	142·8	3	36·0
1959	1	19·8	1	43·2	2	24·4	5	44·5
1960	3	17·2	8	100·7	1	8·8	2	63·6
1961	4	14·8	6	70·8	11	49·2	7	147·6
1962	3	53·0	3	27·4	8	220·0	3	67·6
1963	3	47·4	6	81·8	10	105·0	7	97·2
1964	3	32·2	7	95·4	5	86·8	3	62·4
1965	1	8·0	2	30·1	9	90·1	3	65·0
1966	1	2·2	5	18·4	12	311·2	8	99·9
1967	3	28·8	7	119·5	5	56·4	4	33·8
1968	3	29·6	2	17·6	4	43·4	5	209·2
1969	1	1·6	3	11·1	7	65·6	3	7·0
Total ..	34	311·2	64	856·1	93	1,443·5	72	1,373·0
Average ..	2	20·7	4	57·1	6	96·2	5	91·5

THANJAVUR—*cont.*

	June.		*July.*		*August.*		*September.*	
	Number of days.	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*
	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
		M.M.		M.M.		M.M.		M.M.
1955	1	0·3	5	34·0	7	69·9	8	139·2
1956	7	124·0	1	0·3	3	23·9	11	166·9
1957	5	69·9	5	62·2	5	48·8	6	159·3
1958	2	32·9	2	19·5	6	130·2	1	1·5
1959	7	129·4	1	0·2	2	14·6	6	99·9
1960	1	11·5	8	254·0	1	23·4	5	98·0
1961	5	76·0	4	31·0	10	82·0	8	172·6
1962	5	42·2	1	1·6	10	114·4	6	63·6
1963	7	98·8	6	163·0	12	81·8	9	117·8
1964	5	58·9	13	138·9	7	126·9	8	54·8
1965	1	33·0	4	46·2	15	199·0	6	68·9
1966	6	116·6	5	48·2	16	381·8	10	132·0
1967	6	50·4	2	40·5	12	78·0	7	84·0
1968	2	66·1	1	3·1	5	34·8	9	113·2
1969	1	1·4	3	32·8	10	149·7	2	7·0
Total ..	61	911·4	61	868·5	121	1,559·2	102	1,478·7
Average ..	4	60·8	4	57·9	8	103·9	7	97·6

THIRUVARUR—*cont.*

Year.	October.		November.		December.		Total.	
	Number of days.	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*
	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)
		M.M.		M.M.		M.M.		M.M.
1955	8	207·3	5	141·7	7	295·1	53	1,233·3
1956	11	248·9	13	423·9	8	182·6	55	1,229·4
1957	11	255·3	15	288·5	13	433·8	55	1,418·0
1958	11	164·5	11	347·0	4	26·8	48	864·0
1959	13	264·7	11	327·8	6	173·6	48	1,060·5
1960	9	141·2	19	953·5	6	117·2	57	1,391·1
1961	10	127·8	13	90·0	8	198·8	74	965·8
1962	18	357·6	6	287·8	4	85·2	55	1,254·4
1963	7	228·2	16	572·6	11	461·0	71	1,911·2
1964	9	182·1	10	124·8	6	121·5	49	781·1
1965	4	131·8	17	142·6	13	552·0	60	1,248·8
1966	14	411·8	11	221·6	7	175·5	70	1,288·6
1967	12	302·6	9	191·0	14	506·9	61	1,367·2
1968	7	133·2	9	364·2	5	183·1	45	1,141·3
1969	20	330·0	13	505·6	20	840·0	75	1,889·7
Total ..	164	3550·6	178	4,882·6	132	4,353·1	856	1,9044·4
Average ..	11	236·7	1	325·5	9	290·2	58	1,269·6

THANJAVUR.

Year.	June.		July.		August.		September.	
	Number of days.	Rainfall	Number of days.	Rainfall.	Number of days.	Rainfall.	Name sf days.	Rainfall.
(12)	(13)	(14) M.M.	(15)	(16) M.M.	(17)	(18) M.M.	(19)	(20) M.M.
1955	9	201·2	7	138·4	6	208·0	60	995·7
1956	10	226·8	11	245·1	4	47·0	62	1,019·4
1957	11	144·0	11	104·6	10	172·6	68	786·2
1958	6	85·3	5	150·2	3	17·6	40	704·8
1959	8	114·0	10	152·1	3	42·4	45	659·2
1960	8	101·0	18	323·0	2	24·0	52	963·8
1961	11	207·4	7	85·8	6	87·4	69	940·9
1962	16	354·9	7	84·8	2	16·6	51	763·7
1963	13	218·8	16	172·4	10	264·2	93	1,472·2
1964	11	158·7	15	96·3	4	89·6	68	691·3
1965	7	185·0	19	59·3	14	365·5	69	1,111·7
1966	11	370·0	5	107·5	5	85·7	72	1,395·2
1967	13	163·9	7	198·9	4	151·1	52	781·2
1968	6	109·5	11	192·5	5	118·7	51	795·9
1969	16	181·4	10	201·7	8	139·1	51	735·4
Total ..	156	2,771·9	152	2,312·6	86	1,826·1	883	13,816·6
Average ..	10	184·8	10	154·8	6	121·7		**921·1**

THIRUTHURAIPOONDI.

Year.	January.		February.		March.		April.		May.	
	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfal
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
		M.M.		M.M.		M.M.		M.M.		M.M.
1955	6	47·24	1	1·01	..	..	4	224·02	10	122·68
1956	5	74·42	..	..	..	..	1	20·06	2	3·81
1957	..	..	3	11·17	..	..	..	..	6	14·98
1958	2	33·78	..	..	2	14·98	3	25·65	66	93·72
1959	1	3·10	1	2·70	..	..	5	122·20	3	37·10
1960	1	7·00	4	136·40	..	..	4	42·10	3	20·00
1961	5	142·60	1	0·90	..	..	1	1·30	2	26·60
1962	2	44·90	2	30·50	..	..	1	0·40	2	11·50
1963	6	414·40	..	..	3	61·10	3	62·20	2	40·00
1964	..	..	..	..	..	..	1	18·00	3	132·00
1965	1	2·00	4	32·60	..	..	4	54·00	3	61·00
1966	5	83·80	..	..	1	22·60	3	45·40	2	61·80
1967	1	45·00	1	16·00	5	39·20	1	4·60	4	21·10
1968	3	41·00	1	4·10	..	..	5	81·50	2	7.00
1969	..	..	2	22·30	..	..	1	5·30	3	40·50
Total ..	38	666·24	20	257·68	11	1139·88	37	706·73	53	693·79
Average ..	2	44·42	1	17·18	1	9·33	2	47·12	4	46·25

VEDARANYAM.

Year.	January.		February.		March.		April.		May.	
	Number of days.	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*	*Numbers of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1955	6	63·50	1	2·50	..	..	2	281·00	9	164·50
1956	3	128·50	..	..	..	..	1	53·75	1	12·25
1957	1	0·50	1	7·50	..	..	2	12·50	7	53·50
1958	1	10·40	..	..	1	2·30	..	26·50	6	56·40
1959	3	42·00	1	4·00	..	..	3	49·00	3	54·20
1960	5	55·20	2	26·20	1	2·20	6	29·80	5	31·00
1961	6	124·40	..	..	..	..	1	0·40	2	10·70
1962	3	64·20	3	28·80	..	..	2	17·20	4	32·90
1963	10	233·20	1	1·20	8	232·40	3	23·20	1	6·60
1964	3	11·80	..	..	1	8·60	1	2·60	2	54·90
1965	1	3·70	4	56·50	..	..	2	99·00	1	1·30
966	3	78·70	..	..	2	46·50	4	47·70	1	61·20
1967	2	16·40	2	16·00	3	11·04	1	26·05	3	14·06
1968	3	18·20	1	4·20	4	17·10	9	50·00	3	10·40
1969	3	24·10	2	9·60	..	..	..	..	4	20·60
Total ..	53	925·00	18	157·00	20	320·11	38	718·90	52	539·4
Average ..	4	61·93	1	10·47	1	21·34	3	47·94	4	39·80

THIRUTHURAIPOONDI—*cont.*

Year	June.		July.		August.		September.	
	Number of days.	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*
(1)—*cont*	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
		MM.		MM.		MM.		MM.
1955	4	37·33	2	9·90	14	297·68	13	93·98
1956 . ..	6	170·94	2	37·59	12	122·12	9	62·73
1957	6	72·64	6	111·76	5	61·97	6	85·60
1958 . ..	1	7·90	5	83·60	10	131·30	5	74·60
1959	2	31·20	1	9·30	4	53·00	8	102·20
1960	2	9·40	11	127·00	1	15·00	5	71·60
1961	8	55·40	2	29·80	3	23·10	4	67·60
1962	2	129·60	2	25·20	4	132·10	4	112·90
1963	2	37·00	5	103·80	7	135·00	4	39·60
1964	1	7·00	9	103·20	6	78·20	7	91·20
1965	4	31·70	4	44·60	12	177·60	4	47·60
1966	3	56·50	6	43·00	13	286·20	7	43·20
1967	6	95·50	4	26·00	10	95·40	6	37 ·50
1968	..	..	3	31·80	9	70·12	10	199·83
1969	1	3·00	2	63·00	8	100·40	1	6·38
Total ..	48	745·11	64	849·75	128	1,779·84	93	1,136·39
Average ..	3	49·67	4	54·65	8	118·66	6	75·76

VEDARANYAM.

Year.	June.		July.		August.		September.	
	Number of days.	Rainfall	Number of days.	Rainfall	Number of days.	Rainfall	Number of days.	Rainfall.
(1)—cnot.	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
		M M.		M M.		M M.		M M.
1955	1	32·50	1	1·00	8	246·75	6	121·00
1956	4	53·50	3	97·50	5	96·25	5	143·75
1957	1	7·00	6	80·00	4	20·75	4	133·00
1958	1	1·50	4	55·30	5	64·00	4	65·10
1959	3	18·40	3	27·00	2	17·00	6	55·80
1960	1	8·00	7	96·80	1	2·20	6	17·20
1961	4	43·50	4	72·20	4	19·60	7	121·50
1962	2	133·80	3	37·40	4	102·10	6	72·40
1963	3	20·30	2	22·40	7	163·60	4	161·10
1964	1	14·40	8	74·50	4	132·80	7	105·70
1965	1	5·10	2	5·40	12	165·80	7	54·50
1996	1	3·30	3	43·10	12	268·90	8	144·10
1967	8	63·06	5	51·03	5	104·02	6	25·05
1968	..	..	3	14·80	4	94·60	10	115·70
1969	1	2·20	3	23·40	6	170·60	3	55·40
	32	404·56	57	701·85	90	1068·67	89	1303·30
Avorage ..	2	26·96	4	26·79	6	111·24	6	86·89

THIRUTHURAIPOONDI.

Year.	October.		November.		December.		Total	
	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.
(1)—*cont.*	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
		M M		M M		M M		M M
1955	11	127·98	14	179·32	10	449·32	89	1,589·48
1956	13	133·09	21	362·45	10	125·52	79	1,112·48
1957	14	173·22	18	281·17	17	625·87	81	1,439·38
1958	17	268·00	11	328·48	9	29·80	71	1,091·81
1959	12	335·60	12	438·10	6	102·70	55	1,236·70
1960	6	177·00	20	649·40	3	21·00	60	1,275·90
1961	10	185·90	12	124·40	7	192·90	55	850·50
1962	15	336·90	10	233·40	3	57·40	47	1,114·80
1963	8	303·00	17	677·40	10	751·80	67	2,554·30
1964	7	97·30	14	180·00	4	187·30	52	894·70
1965	9	107·20	17	191·80	15	567·00	75	1,317·10
1966	15	356·00	10	177·40	9	201·40	74	1,377·90
1967	16	404·50	13	222·80	16	446·20	83	1,454·00
1968	9	111·40	5	296·90	5	138·20	52	981·85
1969	11	176·30	10	423·20	18	470·60	56	1,310·80
Total ..	173	3,292·41	204	4,766·22	142	4,367·71	996	19,401·70
Average ..	12	219·49	14	317·75	10	291·18	..	..

VEDARANYAM.

	October.		November.		December,		Total.	
	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.
(1)—*cont.*	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
	..	M M.		M M.		M M.		M M.
1955 ..	10	289·50	12	237·25	10	348·50	64	1,783·00
1956 ..	11	184·75	14	377·00	10	188·50	57	1,345·75
1957 ..	17	306·25	20	451·25	21	805·25	84	1,877·50
1958 ..	9	145·40	7	171·40	4	30·50	43	833·20
1959 ..	12	342·60	10	347·70	5	200·60	51	1,158·30
1960 ..	9	196·70	21	899·90	1	80·30	65	1,449·90
1961 ..	10	24·70	15	210·60	8	223·70	61	901·30
1962 ..	20	509·60	10	273·50	4	75·50	61	1,347·00
1963 ..	7	281·60	15	486·50	11	469·50	72	2,001·10
1964 ..	8	165·20	13	312·10	3	116·00	51	1,000·60
1965 ..	9	1·20	16	292·10	14	588·40	69	1,278·00
1966 ..	14	414·80	5	95·06	8	120·05	61	1-323·41
1967	16	321·04	16	438·05	17	862·60	84	1,952·42
1968 ..	9	149·70	13	54·20	6	141·80	65	718·90
1969 ..	16	388·50	10	472·60	15	143·80	63	2,310·80
Total ..	177	3,721·04	201	5,369·21	187	5,390·00	955	21,276·18
Average ..	12	248·07	14	357·95	9	359·33		

APPENDIX I-C.

STATEMENT SHOWING THE ANNUAL RAINFALL OF THANJAVUR FOREST DIVISION.

(Average from 1955—1969.)

Serial number and name of station.	*January.*		*February.*		*March.*		*April.*	
	Number of days.	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*	*Number of days.*	*Rainfall.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		M.M.		M.M.		M.M.		M.M.
1 Aranthangi	2	28·74	1	10·17	1	11·17	3	43·41
2 Adiramapattinam	3	39·63	1	17·02	1	25·47	3	48·80
3 Coleroon	3	39·50	2	7·34	1	16·42	1	25·16
4 Grand Anicut	2	22·81	1	1·75	1	14·00	2	38·90
5 Kumbakonam	2	29·80	1	5·60	1	10·10	3	31·50
6 Lower Anicut	2	24·80	1	6·10	1	8·90	1	14·20
7 Mayuram	2	40·70	1	4·60	1	10·70	2	36·90
8 Mannargudi	3	39·97	1	14·64	1	9·05	2	25·32
9 Muthupet	3	44·14	1	13·90	2	23·61	3	45·65
10 Nannilam	2	40·00	1	12·80	1	15·20	2	42·50
11 Nagapattinam	4	63·60	1	8·20	1	10·60	2	23·10
12 Pattukottai	2	43·97	1	13·67	2	28·79	3	41·36
13 Sirkali	3	40·40	1	6·80	1	11·70	1	23·70
14 Thiruvarur	3	41·40	1	8·00	1	13·30	2	40·50
15 Thanjavur	2	30·90	1	5·60	1	12·40	3	38·30
16 Thiruthuraipoondi	2	44·42	1	17·18	1	9·33	2	47·12
17 Vedaranyam	4	61·93	1	10·47	1	21·34	3	47·94
Total	44	676·71	18	163·84	19	252·08	37	614·36

Serial number and name of station.	May.		June.		July.		August.		September.	
	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.
(1)—cont.	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
		M.M.		M.M.		M.M.		M.M.		M.M.
1 Aranthangi	3	54·76	3	59·23	5	73·05	6	106·97	6	106·21
2 Adirampattinam	3	43·72	4	36·22	5	58·98	7	110·16	6	93·83
3 Coleroon	2	33·41	3	45·45	6	69·59	9	140·41	7	109·04
4 Grand Anicut	3	40·57	3	35·83	2	24·36	6	84·59	6	127·56
5 Kumbakonam	3	52·60	3	42·20	4	52·50	7	114·30	6	108·60
6 Lower Anicut	3	14·30	3	46·20	3	51·40	8	126·60	6	130·80
7 Mayuram	2	41·20	2	37·40	4	53·80	7	120·40	6	108·60
8 Mannargudi	3	42·22	3	30·06	5	45·86	8	139·13	7	92·36
9 Muthupet	3	51·80	3	45·67	5	46·56	8	199·83	7	84·99
10 Nannilam	3	15·30	2	22·90	4	63·40	6	90·40	6	100·10
11 Nagapattinam	2	30·10	2	26·60	5	55·00	6	87·20	5	73·30
12 Pattukkottai	3	46·57	3	36·39	4	52·30	8	121·09	7	111·44
13 Sirkali	2	46·80	3	30·90	4	52·90	8	134·80	5	102·70
14 Thiruvarur	2	48·40	2	20·70	4	57·10	6	96·20	5	91·50
15 Thanjavur	3	51·30	4	60·80	4	57·90	8	103·90	7	98·60
16 Thiruthuraipoondi	4	46·25	3	49·67	4	54·65	8	118·60	6	75·76
17 Vedaranyam	4	39·50	2	26·96	4	46·79	6	111·24	6	86·89
Total ..	48	735·80	48	653·18	72	916·14	116	1,945·82	104	1,702·28

III Rolling.

Serial number and name of station.	October.		November.		December.		Total.	
	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.	Number of days.	Rainfall.
(1)—cont.	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
		M M.		M M.		M M.		M M.
1 Aranthangi	10	190·11	9	168·41	6	143·48	55	995·71
2 Adiramapattinam	12	266·39	12	229·96	8	182·39	62	1,152·57
3 Coleroon	21	301·41	12	362.10	8	222·80	75	1,372·63
4 Grand Anicut	10	207·86	9	156·29	6	100·66	51	855·18
5 Kumbakonam	12	217·40	11	233·20	7	158·60	60	1,056·40
6 Lower Anicut	11	229·70	14	335·60	8	178·60	61	1,167.20
7 Mayuram	13	224·50	12	331·90	8	183·60	60	1,194·70
8 Mannargudi	11	225·51	12	241·00	8	250·84	64	1,153·06
9 Muthupet	12	258·51	13	276·30	8	288·66	68	1,319·62
10 Nannilam	12	207.10	11	315·30	9	218·40	59	1,180·40
11 Nagapattinam	11	269·40	14	390·90	9	301·90	62	1,339·80
12 Pattukkottai	11	221·26	12	114·62	8	204·57	64	1,136·03
13 Sirkali	11	258·20	12	369·80	8	244·80	59	1,323·50
14 Thiruvarur	11	236·70	12	325·50	9	290·20	58	1,269·50
15 Thanjavur	10	184·80	10	154·80	6	121·70	59	921·00
16 Thiruthuraipoondi	12	219·49	14	317·75	10	291·18	67	1,291·40
17 Vedaranyam	12	248·07	14	357·95	9	359·33	66	1,418·41
	202	3,963·81	208	4,781·28	135	3,741·81	1,090	20,147·11

APPENDIX I-D.

Rainfall Normals of Thanjavur District in M.M. Based on Records from 1901 to 1950

Serial number and Stations. (1)	*January.* (2)	*February.* (3)	*March.* (4)	*April.* (5)	*May.* (6)	*June.* (7)
District Normal	64·6	19·1	20·5	39·5	54·6	33·9
1 Thanjavur	55·1	13·5	16·8	35·6	55·6	41·4
2 Tiruvadi	49·8	15·7	12·9	30·7	57·1	39·9
3 Tirukattupalli	40·6	14·0	15·7	39·9	60·7	38·3
4 Grand Anicut	24·9	17·8	17·3	47·5	74·2	30.2
5 Papanasam	59·4	16·3	21·1	39·4	59·2	39·6
6 Valangiman	58·7	15·7	19·8	37·1	65·8	37·6
7 Kumbakonam	61·7	14·0	17·8	32·8	62·5	45·7
8 Mayuram	76·2	21·3	19·1	34·0	62·0	32·3
9 Tranquebar	64·8	20·8	21·1	33·0	42·9	25·1
10 Sirkali	79·8	24·6	19·1	26·9	43·7	29·7
11 Nannilam	74·9	19·1	21·6	36·6	56·1	29·0
12 Kodavasal	70·9	15·0	20·1	39·4	59·4	37·6
13 Tiruvarur (Tiruvalur) ..	78·7	25·1	25·1	37·1	55·4	32·3
14 Thiruthuraipoondi ..	73·4	17·5	20·3	42·2	43·4	31·0
15 Mannargudi	63·0	17·5	19·1	51·8	53·3	40·6
16 Pattukkottai	59·2	17·0	24·1	45·7	48·5	38·6
17 Aranthangi	49·5	15·0	19·1	41·4	53·1	38·1
18 Neidarasal	68·3	22·6	19·8	29·5	38·1	26·9
19 Tirupoondi	90·7	23·1	27·7	32·0	44·5	27·4
20 Kattumavadai	53·3	22·9	22·9	50·3	48·5	23·4
21 Vallam	52·8	15·2	17·5	35·6	67·8	47·0
22 Muthupet	68·6	25·1	24·4	56·9	51·8	32·3
23 Needalamangalam ..	57·9	15·7	18·0	39·4	53·3	38·1

APPENDIX I-DA

RAINFALL NORMALS OF THANJAVUR DISTRICT IN M. M. BASED ON RECORDS FROM 1901 TO 1950—*cont.*

July.	*August.*	*September.*	*October.*	*November.*	*December.*	*Annual.*
(8)	(9)	(10)	(11)	(12)	(13)	(14)
47 2	96·6	108·3	200.5	299·6	163·4	1,147·8
48·0	108·2	132·3	156·5	197·5	109·0	969·9
43·9	102·6	110·7	172·5	192·8	108·2	936·8
39·1	110·7	117·9	163·6	177·3	87·4	905·2
35·6	99·1	103·1	178·6	158·2	73·1	859·6
49·5	99·6	104·9	184·7	248·4	124·5	1,046·6
48·3	104·4	116·6	179·6	268·7	134·9	1,087·2
50·3	105·9	126·5	178·1	264·4	141·7	1,101·4
39·6	104·4	99·8	232·2	389·6	184·4	1,294·9
35·1	73·7	87·6	252·5	408·2	215·1	1,280·2
49·8	114·1	109·7	257·8	422·1	212·6	1,389·9
48·8	89·1	107·9	206·0	361·7	201·2	1,252·0
53·3	101·1	119·1	195·8	303·0	169·2	1,183.9
44·5	86·6	95·8	204·7	364·7	203·7	1,253·2
43·4	87·6	101·1	204·7	337·8	197·1	1,199·5
53·9	114·3	122·4	177·0	270·3	163·6	1,146·8
60·7	101·1	106·2	180·3	234·7	151·1	1,067·3
54·1	99·8	99·6	159·5	169·4	101·1	899·7
39·1	95·8	100·6	257·1	433·1	206·5	1,337·4
42·4	80·5	90·9	254·0	447·5	253·5	1,414·2
38·6	72·4	79·8	177·5	192·8	112·3	894·7
54·6	132·8	141·5	164·9	184·4	109·2	1,023·3
47·2	90·9	125·2	203·2	287·5	183·4	1,196·5
57·1	107·2	115·3	167·6	271·0	156·2	1,096·8

APPENDIX II.

RIGHTS AND CONCESSION ADMITTED IN THE RESERVE FOREST IN THANJAVUR FOREST DIVISION.

Talainayar Reserve Forest.

Notificaion Number.—Chief Conservator of Forest's Ref. No. 152/50, dated 8th April 1950.

In exercise of the poers delegated under section 16 of the Madras Forest Act, 1882 (The Madras Act V of 1882), the Chief Conservator of Forests, Madras hereby grants a right of way over the foot and cattle path from Avarikadu to Vandal, as described in detail in the Schedule, within Talainayar reserved forests in Thiruthuraipoondi taluk, Thanjavur district, subject to the condition that the right hereby granted shall be liable for cancellation at the discretion of the Chief Conservator for Forests in case of misuse or for other reasons.

SCHEDULE.

Foot and cattle path from Avarikadu to Vandal open to a width of four yards and to a total distance of twenty chains for men and cattle.

Description.—It enters the reserve on the mouth side of S. No. 53 of Avarikadu village at a point 60 links east of its north-west corner, runs for a distance of 400 links at a bearing of 355 and leaves the reserve on the south side of S. No. 325/1.2 of Talainayar III Sethi village, at a point 1542 links east of its south-west corner.

Kodiakadu Reserve Forest.

Notification No. 188, *4th May* 1952.

The under mentioned paths are admitted and recorded within the reserve: Path Nos. 1, 2, 3 and 4 are cart tracks open for men, cattle and carts. Path Nos. 1, 2 and 3 to a width of 6 yards. Part No. 4 to a width of 3 yards. Path No. 5 to 10 are foot paths for men and cattle only. Path Nos. 5 to 7 o a width of 11 yards and 8 to 10 a width of 3 yards.

Cart track No. 1.—From cart track No. 2 (described below) to Servaraya Iyernarkoil. It branches from the former at a point about one chain from post No. 22 on the west boundary of the reserve and running east-south-east through the reserve leaves it on the west side of the said koil. This cart track is also down as "Onathimikulam cart track".

Cart track No. 2.—From Kodiakadu to Vedaranyam enters the reserve on its west boundary at Post No. 22, eight chains south-west of the boundary stone at Post No. 1 and running south and west leaves it at Post No. 19 about 24 chains north-north-east of Kollapanaicken mantapam, again enters the reserve for the third time at post No. 16 about 44 chains south south-west of the above mentioned mantapam and running south west through the reserve leaves it finally at Post No. 12 five chains east of Post No. 13. This cart track is also known as the Kodiakadu-Nagapatnam cart track.

Cart track No. 3.—From Kodiakadu to Servaraya Iyernarkoil enter the reserve on its west boundary at Post No. 10 about 52 chains north of post No. 8 and running north-easterly through the reserve, joins cart track No. 1 at a post about 25 chains west of the said koil. This path is also known as Perallam Nallattanni pallam cart track.

Cart track No. 4.—From Amirthagudeswaraswamy koil to Point Calimere, enters the resreve on its west boundary at post No. 9, 42 chains north of post No. 8 and running easterly leaves the reserve at post No. 5 about 7 chains south-west of post No. 4.

Foot path No. 5.—From cart track No. 2 to Ramaswamipatham branches from the former at a point about 9½ chains south of post No. 20 and runs east and north to the said Patham. Its distance is 2 chains and 25 links.

Foot path No. 6.—From cart track No. 2 to Modimantapam, branches from the former at a point above 17 chains from Post No. 20 and runs south-eastwards to the mantapam. Its distance is 9 chains and 25 links.

Foot path No. 7.—From Ramaswamipatham to Modimantapam, runs in a south-easterly direction from the former to the latter.

Foot path No. 8.—From Kodiakadu to Periapalayamkolam, enters the (reserve on its west boundary at Post No. 15 about 8 chains 10 links north-west of the boundary stone at Post No. 13 and runs north-west to the kolam for 6 chains.

Foot path No. 9.—From Kodikadu to Chinnapalayakolam, enters the reserve on its west boundary at post No. 14 about 4 1/5 chains from post No. 13 and runs northerly to the said kolam for 2 chains and 32 links.

Foot path No. 10.—From the junction of cart tracks No. 1 and 3 to the patta land (iii) inside the reserve. It runs in a north-easterly direction entering the enclosure on its southern side. Its distance is 6 chains.

The under mentioned places are demarcated out of reservation and retained as enclosures for the use of worshippers :—

(1) The Servaraya Iyernarkoil situated 19½ chains west of the eastern boundary and 72 chains south of the north boundary of the reserve with a space of 3 chains length all round. It is approached from Kodiakadu by cart tract No. 3 and from Vedaranyam and Agasthiampalli villages by cart track No. 1.

(2) A stone mantapam called Ramaswamipatham about 2 chains east of cart track No. 2 with a space of 11 yards all round is approached by food path No. 5.

(3) Modimantapam, an old stone building, about 300 yards south-east of Ramaswamipatham, with a space of 3 chains length all round, is approached by foot paths Nos. 6 and 7. The right to bring the Vedaranyam and Segulswamies to the mantapam and burn lights, torches and fire-works on the occasion is admitted.

(4) The bank of a Pond called Aviliakolam, some three hundred yards west-south-west of Modimantapam with a space of 11 yards round it is approached from cart track No. 2.

A block of 28 acres containing 6 patches of Kattukuttayaipatta land which was excluded from the forest and treated as an enclosure and is approached by path No. 10 supra, which branches at the junction of the cart tracks No. 1 and 3 and running in a north-easterly direction enters the enclosure on its southern side has been acquired as per land acquisition order No. 6/69, dated 16th December 1969.

APPENDIX III.

LIST OF TREES, SHREBS AND HERBS COMMONLY FOUND IN THANJAVUR FOREST

Serial number. (1)	*Botanical name.* (2)	*Tamil name.* (3)
	Botanical name	Karuvelan
2	*Acacia ferruginea*	Parambal
3	*Acacia leucophloea*	Velvelan
4	*Acacia latronum*	Koradai
5	*Acacia sumdra*	Karungali
6	*Acacia intsia*	Indu
7	*Acacia senegal*	...
8	*Acacia planifrons*	Kodavelam
9	*Acacia pennata*	Vellai indu (**Kattusikai**)
10	*Acalypha fruticosa*	Cinnai
11	*Acanthus ilicifolius*	Mulkalli
12	*Adina cordifolia*	Manjakadambai
13	*Aegiceras corniculatum*	Narikandam
14	*Ailanthus excelsa*	Pimaram
15	*Alangium lamarckii*	Alingi
16	*Albizzia amara*	Usil
17	*Albizzia lebbeck*	Vagai
18	*Albizzia odoratissima*	Karivagai
19	*Alangium salvifolium*	Alingi
20	*Alysicarpus monitifer*	...
21	*Anacardium occidentale*	Mundiri
22	*Asparagus racemosus*	Manikudukal
23	*Atlantia monophylla*	Kattu elumichi
24	*Avicennia officinalis*	Alayathi
25	*Avicennia alba*	Alayathi
26	*Avicennia marina*	Venkandan
27	*Azadirachta indica*	Veppan
28	*Azima tetracantha*	Sanguchedi
29	*Barleria prionitis*	Kattukanakambaram
30	*Barleria acuminata*	Karumkurunji
31	*Biopytum sensitinum*	...
32	*Blopharis bofrhanviaefolia*	...
33	*Borreria articularis*	...
34	*Bruguiceras cylindrica*	...
35	*Calophyllum inophyllum*	Pinnai
36	*Cassia fistula*	Konnai
37	*Cassia tora*	Thagari
38	*Cassia occidentalis*	Ponavarai
39	*Cassia kloinii*	...

APPENDIX III—*cont.*

LIST OF TREES, SHREBS AND HERBS COMMONLY FOUND IN THANJAVUR FOREST DIVISION—*cont.*

Serial number. (1)	*Botanical name.* (2)	*Tamil name,* (3)
40	*Cassia auriculata*	Avaram
41	*Carissa opaca*	Kilaka
42	*Carissa cungesta*	Kila
43	*Carissa spinarum*	Sirukilai
44	*Cadaba fruticosa*	Velundu
45	*Calotropisgigantea*	Eruka
46	*Capparis sepiaria*	Thoratti
47	*Cartava ralifiosa*	...
48	*Canthium dicoccum*	...
49	*Ceriops rozburghiana*	...
50	*Chloroxylon swietenia*	...
51	*Clerodendrum serratum*	Porasu
52	*Cleistanthus collinus*	Cheruthekku
53	*Commiphora candada*	Uduvan
54	*Commiphora berryi*	Mulkiluvai
55	*Cordia monoica*	Narivalli
56	*Cressa crotrica*	...
57	*Cyrocarpus jacqunii*	Thanaku
58	*Dalbergia paniculata*	Adukuvagai (Pachali)
59	*Dicerma diarticulatum*	...
60	*Dichopsis elliptica*	Palvadinjan
61	*Dodonaea viscosa*	Virali
62	***Elaeodendron glaucum***	Veerai
63	*Emblica officinalis*	Nelli
64	*Erythroxylon tomentosum*	Sembulichan
65	*Excoecaria agallocha*	Thillai
66	*Ficus bengalensis*	Alai
67	*Ficus retusa*	Ichi
68	*Ficus gibbosa*	Athi
69	*Flacourtia indica*	Kattukala
70	*Givotia rottleriformis*	Bhoothalai
71	*Glycosmis cochinchinensis*	Kulapana
72	*Grewia hirsuta*	Thadasu
73	*Gyrocarpus jacqunii*	Vallai thanaku
74	*Gymnosporia emarginata*	Kattangi
75	*Helicteres isora*	Valambiri
76	*Hibiscus micranthus*	Cirramutti
77	*Holarrhena antidysentenica*	Veppalai
78	*Incigofera tinctoria*	**Nila**
79	***Inga dulcis***	Kodukapuli

APPENDIX III—*cont.*

LIST OF TREES, SHREBS AND HERBS COMMONLY FOUND IN THANJAVUR FOREST DIVISION—*cont.*

Serial number. (1)	*Botanical name.* (2)	*Tamil name.* (3)
80	*Ionidium sufferuticosum*	**Kodukapuli.**
81	*Isonandra iancslata*	Do.
82	*Ixora arboren*	Kora.
83	*Jasminum rigidum*	Kattumalli.
84	*Jatropha glandulifera*	Adalai.
85	*Justicia diffusa*	...
86	*Lantana camara*	Lantana.
87	*Lannea coromandelica*	Odayamaram.
88	*Launata pinnatifide*	...
89	*Leucas aspera*	Thumbai.
90	*Lepisanthes tetraphylla*	Kuhamathi
91	*Lumnitzera racemosa*	Thippurutti
92	*Manilkara littoralis*	...
93	*Manilkara hexandra*	Palai.
94	*Manilkara elangi*	Magilam
95	*Marremia tridentata*	...
96	*Maba buxifolia*	Kattuthovari.
97	*Memecylon umbellatum*	...
98	*Memecylon edule*	Kasan.
99	*Mimosa pudica*	Thottasununki.
100	*Morinda tinctoria*	Nona.
101	*Mollugo disticha*	...
102	*Mollugo nudicaulis*	...
103	*Mollugo cerviana*	...
104	*Ocimum sanctum*	Thulasi
105	*Odina wodier*	Odaya maram.
106	*Oldenlandia umbellata*	Saya.
107	*Opuntia dillenii*	Chappathi kalli.
108	*Pavetta indica*	Pavetta.
109	*Parkinsonia aculeata*	Chembu kuruvai.
110	*Pavonia zeylanica*	Kurundotti.
111	*Phyllanthus simple*	Kilanelli
112	*Phaseolus trilovus*	Panipayir.
113	*Phoenix acaulis*	Ichan.
114	*Pongamia pinnata*	Pongam.
115	*Polygala chinensis*	...
116	*Polycarpaea corymbosa*	
117	*Putranjiva roxburghii*	...
118	*Prosopis juliflora*	Velikathan.
119	*Rhizophori candelaria*	Kandal.

APPENDIX III—*cont.*

LIST OF TREES, SHREBS AND HERBS COMMONLY FOUND IN THANJAVUR FOREST DIVISION—*cont.*

Serial number. (1)	*Botanical name.* (2)	*Tamil name.* (3)
120	*Rhizophori mucronata*	Kandal.
121	*Sabira plebeia*	...
122	*Sapindus emarginatus*	Naikottai.
123	*Salvadora indica*	Opa
124	*Salicurnia luacteata*	...
125	*Securinega virosa*	...
126	*Sida cordifolia*	...
127	*Sideroxylon tomentosum*	Palai.
128	*Solanum pubescens*	Anai sundakai.
129	*Strychnos nux-vomica*	Etti.
130	*Streblus asper*	Pura, pirasu.
131	*Supermacoce hispida*	Nutti choori.
132	*Suaeda maritima*	...
133	*Suaeda moneica*	..
134	*Syzygium cumini*	Navalmaram.
135	*Tamarindus indica*	Puliamaram.
136	*Tephrosia purpurea*	Kolinji.
137	*Thespesia populnea*	Poovarasu.
138	*Tribulus terrestris*	Nerinjimullu.
139	*Trichodesma indicum*	...
140	*Trema orientalis*	Amparuthi.
141	*Vitex altissima*	Myladi.
142	*Vitex negundo*	Nochi.
143	*Waltheria indica*	...
144	*Wrightia tinctoria*	Palai.
145	*Zizyphus jujuba*	Elandai.
146	*Zizhyphus xylopyrus*	Kottai elandai.
147	*Zizyphus rugosa*	Kattilandai.

CLIMBERS.

	Botanical Name.	*Tamil Name.*
1	*Abrus precatorius*	Kundumani.
2	*Acacia intsia*	Indumullu.
3	*Asparagus rucemosus*	Kadamulam
4	*Cossytha filiformis*	...
5	*Cephalandra indica*	Kovay.
6	*Cissus quadrangularis*	Pirandai.
7	*Cissampelos convocvulcea*	
8	*Combretum latifolium*	...

CLIMBERS—*cont.*

Serial nnmber. (1)	*Botanical name.* (2)	*Tamil name.* (3)
9	*Cucculus hisutus*	...
10	*Dalbergia spinosa*	...
11	*Derris trifoliata*	...
12	*Derris scandens*	Tekil.
13	*Hemidesmus indicus*	Nannari.
14	*Ipomea bilobia*	Conan kodi.
15	*Jasminum arborescens*	Nagamalli.
16	*Leptadenia reticulata*	...
17	*Pterolobium indicum*	Karicudu mullu.
18	*Tinospora cordifolia*	Chendikodi.
19	*Vitis carnosa*	...
20	*Zizyphus oenoplia*	Soorai mullu.

GRASS.

1	*Aristida hystrix*	Oosi pullu.
2	*Aristida depressa*	Oosi pullu.
3	*Aristida byotrex*	Oosi pullu
4	*Cenchrus ciliaris*	Kolukottai pullu.
5	*Cynodon dactylon*	...
6	*Cyperus arenarius*	...
7	*Cyperus difformis*	...
8	*Cymbobogon coloratus*	Vasanaipullu
9	*Eragrostis tremula*	Seranaipullu.
10	*Eleusine indica*	...
11	*Fimbristylis polytrichoides*	...
12	*Heteropogon contortus*	Oosipullu .
13	*Inperato cylindrica*	...
14	*Spinifix squarrosus*	Ravananthadi
15	*Spinifix littoreus*	...
16	*Themeda triandra*	...

Serial number. (1)	*Botanical name.* (2)	*Tamil name.* (3)
1	Adukuvagai	*Dalbergia paniculata.*
2	Adalai	*Jatropha glandulifera.*
3	Alingi	*Alangium lamarckii.*
4	Alingi	*Alangium salvifolium.*
5	Alayathi	*Avicennia officinalis.*
6	Alai	*Ficus bengalensis.*
7	Ambaruthi	*Trema orientalis.*
8	Anai sundakai	*Solanum pubescens.*

GRASS—*cont.*

Sl. No. and Tamil Name. (1)	*Botanical Name.* (2)
9 Athi	*Ficus gibbosa.*
10 Avaram	*Cassia auriculata.*
11 Bhoothalai	*Givotia rottleriformis.*
12 Cherutmeku	*Clerodendron serratum.*
13 Chembu kuruvai	*Parkinsonia aculeata.*
14 Chappathi kalli	*Opuntia dillenii*
15 Cinnai	*Acalypha fruticosa.*
16 Elandai	*Zizyphus jujuba.*
17 Eruku	*Calotropis gigantea.*
18 Etti	*Strychnos nux-vomica.*
19 Ichan	*Phoenix acaulis.*
20 Ichi	*Ficus retusa*
21 Indu	*Acacia intsia.*
22 Karuvelan	*Acacia arabica.*
23 Kasan	*Memecylon edule.*
24 Karungali	*Acacia sundra.*
25 Karivagai	*Albizzia odaratissima.*
26 Kattuelumichi	*Atlantia monophylla.*
27 Kattu kanakambaram	*Barleriaprionitis.*
28 Kattu kola	*Fkaciyrtra ubduca.*
29 Karum murunji	*Gymnosporia emarginata.*
30 Kattangi	*Gymnosporia emarginata*
31 Kattu malli	*Jasminum riaidum*
32 Kattu thovarai	*Maba buxifolia*
33 Kandal	*Rhizophora candelaria*
34 Kandal	*Zophora mucronata.*
35 Kattilandai	*Zizyphus rugosa.*
36 Kila	*Carissa opaca.*
37 Kilaka	*Carissa cungesta.*
38 Kilanelli	*Phyllanthus simple.*
39 Kodukapuli	*Inga dulce.*
40 Kora	*Ixora arborea.*
41 Koradai	*Acacia latronum.*
42 Konnai	*Cassia fistula.*
43 Kolinji	*Tephrosia purpurea.*
44 Kottai ilandai	*Zizyphus xylopyrus.*
45 Kurunthotti	*Pavonia zeylanica.*
46 Kulapana	*Glycosmis cochinchinensis.*
47 Kuhaimathi	*Lepisanthes tetraphylla.*
48 Lantana	*Lantana camara.*
49 Manjakadambai	*Adina cordifolia.*
50 Manikudukal	*Asparagus racemosus.*

GRASS—*cont.*

Serial and Tamil name. number. (1)	*Botanical name.* (2)
51 Magilara	*Manilkara elangi.*
52 Mundiri	*Anacordium occidentale.*
53 Mulkiluvai	*Commiphora berriyi.*
54 Mulkalli	*Acanthus ilicifolius.*
55 Myladi	*Vitex altissima.*
56 Narikandan	*Aegiceras corniculatum.*
57 Narivalli	*Cordia monoica.*
58 Narikottan	*Sapindus emearginatus.*
59 Navelmaram	*Syzygium cumini.*
60 Nerinji mullu	*Tribulus terrestris.*
61 Neli	*Indigofera tinctoria.*
62 Nelli	*Emblica officinalis.*
63 Nona	*Morinda tinctoria.*
64 Nochi	*Vitex negundo.*
65 Nutti choorai	*Supermacoee hispida.*
66 Odayamaram	*Odina wodiar.*
67 Odayamaram	*Iannea coromandelica.*
68 Opa	*Solvadora indica.*
69 Parambal	*Acaci ferruginea*
70 Palai	*Manilkara hexandra.*
71 Palai	*Sideroxylon tomentosum.*
72 Palai	*Wrightia tinctoria.*
73 Palvadinjan	*Dichopsls elliptica.*
74 Pavetta	*Pavetta indica.*
75 Panipayir	*Phaseolus trilovus.*
76 Pimaram	*Ailanthus excelsa.*
77 Pinnai	*Calophyllum inophyllum.*
78 Poovarasu	*Thespesia populnea.*
79 Ponavarai	*Cassia occidentalis*
80 Porasu	*Chloroxylon swietenia.*
81 Pongan	*Pongamia pinnata.*
82 Pulimaram	*Tamarindus indica.*
83 Pura, Pirasu	*Streblus asper.*
84 Sanguchedi	*Azima tetracantha.*
85 Saya	*Oldenlandia umbellate.*
86 Sembulichan	*Erythroxylon tomen to sum.*
87 Sirukalai	*Carissa spinarum.*
88 Thagarai	*Cassia tora.*
89 Thanaku	*Cyrocarpus jacquinii.*
90 Thadasu	*Grewia hirsota.*
91 Thillai	*Excoecaria agallocha.*
92 Thippurutti	*Lumritzera racemose*

GRASS—*cont.*

Serial and Tamil name. number. (1)	*Botanical name.* (2)
93 Thoratti	*Capparis sepiaria.*
94 Thottalsurungi	*Mimosa pudica.*
95 Thumbai	*Leucas aspera.*
96 Thulasi	*Ocimum sanctum.*
97 Uduvan	*Cleistanthus collinus.*
98 Usil	*Albizzia amara.*
99 Valambiri	*Helicteres isora.*
100 Vagai	*Albizzia lebleceli.*
101 Velvelan	*Acacia leucophloca.*
102 Venkandan	*Avincennia marina.*
103 Veppan	*Azadirachta indica.*
104 Veppalai	*Holarrhena antidysenterica.*
105 Veerai	*Elaeodendron glaucum.*
106 Vellai indi	*Acacia pennata.*
107 Velandu	*Cadabafruticosa*
108 Vellai thanaku	*Gyrocarpus jacquinii.*
109 Velikathan	*Prosopis juliflora.*
110 Virali	*Dodonia viscosa.*

APPENDIX IV-A.

PETS AND DISEASES OF CASHEW AND THEIR CONTROL.

Pests.

Major pests.

1. *Mango Hopper* (*Indiocerus sp.*).—It is a small wedge-shaped insect about 3 mm. in length. The minute eggs are laid on the shoots and leaves. The young hopper resembles the adult but is smaller in size and wingless. The nymph casts its skin periodically and grows into an adult within 10 days.

Both adults and nymphs swarm on the tender portions of the tree and suck up the plant sap by means of their tabular mouth, thus causing a substantial drain in the plant nutrition.

The breeding season corresponds with the mango blossom.

2. *The cashew borer* (*Plocaerus ferrugineus L. family Cerambycidae*).—The medeum sized dark brown longicor beetle is one of the most serious pests of cashew. The antennae are twice the length of the body in the male and not longer than the body in the female. When caught the beetlemakes an indingant squeaking sound.

Eggs are laid under loose bark at the base of the trunk and exposed portions of roots. The white grubs that hatch out bore into the bark and feed on the soft tissues. Some bore into the wood also. A full grown grub is stout, fleshy, soft, dull white in colour and is about 7.5 cm. long. The body tapers slightly from head to tail. The jaws are powerful to burrow into the wood. Pupation is below the soil at a depth of 10-15 cm. in a calcarious shall, half embledded in an excavation made in the wood. The exact life history of the beetle is not known, but it extends over some months. Grubs of different stages of development are met with at any part of the year and so several generations may be overlapping.

The grubs feed on the subepidermal and phloem cells and tissues are tunnelled in various irregular directions. Gummosis sets in. A thick mass of chewed fibre and excreta is thrown behind in the tunnels. The tree is weakened as a result of the arrest of flow of sap; the leaves turn yellow before the tree dies. Such trees can be easily located in a plantation from a distance. The attack is seen mostly in trees over eight years old.

Control.—The cashew borer is a difficult pest to control—

(1) Mechanical removal of eggs, grubs and pupae.

(2) Giving a drenching spraying on the basal trunk and of the roof region with BHC 0.1 per cent.

(3) Syringing the bore holes with chemicals and cutting and removing the badly affected trees.

3. *The leaf miner* (*Acrocercops syngrama M. family*).—This is a major pest appearing during the occurrence of new flush. This is a caterpillar of a tiny silvery moth. The caterpillar is small and pale white and it mines into the tender leaves. The larval stage lasts over nearly two weeks. It falls on the ground and pupates. The pupal stage lasts from 7 to 9 days.

The injury consists of tortuous markings made on the fresh leaves. The thin epidermal peel swells up in the mined areas due to merger of several mined portions and appears as whitish blistered patches which, when the leaf grows, form big holes. Young plants generally suffer most. As many as 8 caterpillars have been noted on a single leaf.

Control.—As the pest is internal, it is difficult to control. Spraying parathion 0.025 per cent synchronising with the formation of new flush may be resorted to.

4. *The leaf eating caterpillar (Cricula trifenestrata H. family—Saturnicae).*—Though a sporadic pest, it sometimes causes extensive defoliation. The caterpillar when full grown is stout, dark brown, about 5 cm. long, clothed with poisonous spines and has sharply defined segments with a reddish white stripe along the side. It pupates inside a loose golden silk cocoa spun amongst leaves and twigs. The adult is a reddish brown moth with three clear spots on the wings.

The alternative hosts are mango, *Terminalia*, *Careya arborea* and other trees. The caterpillar of *Phycita dentilinella* H parasitises this at the pupal stage.

Parathion 0.025 per cent is efficient against such hairy caterpillars. Young stages are susceptible to BHC 10 per cent dust of BHC 0.1 per cent spray.

5. *Caterpillar damaging shoot tip* (Chelaria haligramma M. family.—The cetrpillar damages fresh shoot tips during the time of new flush. It is tiny, yellowish or greenish brown 12 mm. long when full grown and moves about briskly. The pupa is yellowish red and pupates inside the folded leaves or small bore holes made on shoot tips or floral branches. The pupation period is 7 to 8 days. The adult is a tiny dark moth.

Tender leaves are damaged mostly at the bud stage and tender shoot tips are occassionally bored to a length of about 25 mm. The growing shoot tip becomes stunted and sometimes gets scorched up.

Mango is an alternative host.

6. *The tea mosquito (Helopeltis antinii S. family—Capsidae).*—It is one of the most serious pests. The big is reddish brown, active and has a peculiar knobbed process projecting from the dorsal side of the thorax. The nymphs are soft and anti-like and move about slowly on the tender twigs and leaves.

The adults and nymphs suck up the sap by puncturing the tender plant parts such as shoots, leaves, floral branches, thalamus, apple and nuts. The punctured shoots turn dark and dry up to a short length. Generally, fresh shoots sprout from below the dried up portion, but such sprouts are also attacked in turn. When the damage is severe, it results in the drying up of young branches and even the death of the plant if young. When the floral branches are punctured, the flowers fade. The nuts and apples fall after the attack. The bug is suspected into infest a virus.

The alternative hosts are tea, mahogany, neem, cocoa, cinchona, annato, guava apple and grape wine. It is found more on the west coast than on the east.

7. *The leaf thrips (Solenothrips rubrocinctus G. Rhipiphorothrips cruentatus H. Retithrips syriacus M.—family).*—The first two are the more seroius and common. The nymphs of *Solenothrips* are greenish yellow with a red band across the first and last abdominal segments.

Damage is severe on young plants though older trees are not spared sometimes. Due to the sucking and lacerating activity of these, the leaves become pale brown and slightly crinkled. The plants become stunted. The trees in shady areas suffer more. They are observed in a pest form during the hot months and the attack subsides with the onset of monsoon.

Solenothrips is occassionally seen on *Terminalia catappa.*

Control.—BHC 0.05 per cent or Parathion 0.025 per cent (1 c.c. of Folidal in 2 or 1 c.c. of Ekatox 20 in 800 c.c.) spray.

Minor pests :

1. The leaf webber (*Macalla sp.*).—This is the caterpillar of a medium sized dark brown moth and it feeds on the fresh shoots after webbing together the apical leaves. Young plants are damaged during summer. It is often parasitiste by a braconid,

2. The Dark borer (*Indarbela tetraonis M.*).—The caterpiller makes a residential hole on the wood and from there makes inroads through the bark forming galleries. The damage is not serious.

3. Defoliating caterpillar (*Methanastria hyractaca c family Lasiocampidae*).—The caterpillar is about 6 cm. long and hairy. It defoliates the branches and during day time a group of them rest on the base of the trunk. It is also seen on *Acacia arabica* and *Nyctanthes arbor-tristis.*

4. The slug caterpillar (*Parasa lepida Cr. fam. Limacodidae*).—It scrapes and eats the green leafy matter leaving behind the veins. It is bright green and armed with poisonous spines. It pupates on the stem, the pupal case being covered with poisonous heirs. The life cycle lasts for about 10 weeks.

The alternative hosts are castor, mango, pomegranate, citrus, cluster beans, rose, etc.

5. The looper (*Oenospila flaviuscata W. family Geometridae*.—It is about 2.5 cm. long and is greenish when full grown. It feeds on tender leaves especially margins.

6. The mealy bug plan *ococcus lilacinus* C. famil Coccodae) Occurs on tender shoots.

7. The wax scale, *Ceroplastesfloridensis C.* family Caccidae) infests leaves. The lady bird beetle, *Chilocorus nigritus F.* has been seen preying on this scale.

8 The giant scale *Monophebus* sp. (fem. Coccidae) occurs in stray numbers on tender shoots.

9. The beetle *Monolepia longitarsus J.* (family Chrysomelidae) appears in numbers and feeds on tender leaves and stem during the monsoon months of June to August in west coast.

10. The leaf twisting weevil of mango, *Apoderus tranduebaricus F.* occurs at the time of new flush. The beetle folds the leaf along the midrib, deposits eggs on the leaf tip and twists the leaf into a compact roll. The yellow grubs feed on the rolled up leaf tissues. The damage is light.

11	*Mylloceyus discolor* B	Polyphagous weevils often seen feeding on fresh leaves of young plants.	
12	*M. x vipanus* F		
13	*Amblyrhinus poricollis* B		
14	*Prionoma atraium* G	Cerambyoid bores found occasionally.	
15	*Plocaederus consocius* P		
16	*Sylepta auranticallis* F	.. a leof roller.	Oceasional.
17	*Argyroploce ionseria* M	.. (Eucosmiode) Caterpillor	
18	*Anthera paphia* B	.. the Tasser silk moth	

19. The red ant, *Oecophylla smaragdina F.* is a common source of nuisance to cashew growers. Besides nursing the aphids, scales and mealy bugs, this ant aids the spread of these insects from plant to plant.

20. The ant *Camponotus sp.* bites tender leaves of young plants. Black spots are formed in course of time at the injured region and the leaves put on a diseased appearance.

21. The flower thrip, *Rhynco thrips raoensis* G. occurs on the inflorescence and tender leaves. It causes scabs on the floral branches, apples and nuts. The scabbed areas appear as brown patches due to the formation of corky layers. Stray cases of heavy occurrence on isolated trees causing malformation of nuts have been reported. It attacks tender shoots also.

22. An unidentified yellow thrip is commonly seen during the flowering season. The injury caused is the same as the previous insect.

23. The mealy bug *Ferrisiana virgate C.* infesst the inflorescence. solated cases of heavy occurrence were reported. Heavy populations cause the shedding of flowers and drying up of the inflorescence.

24. A soft scale *Coccus* sp. occasionally feeds on tender shoots and nuts.

25. The aphid *Taxoptera odinae* vdg. occurs on the inflorescence branchse and Tender shoots. Heavy infestation can cause flower shedding to some extent. This is occasionally a pest on mango inflorescence.

26. The apple borer, *Nephopterc* sp. bores into tender apples and sometimes into the tender nuts also.

27. The caterpillar of a Tertricid moth feeds on tender nuts. It webs together dried up flowers and shelters inside.

28. A small caterpillar of an unidentified tiny brown moth bores into the ripe apple at the joint between the apple and the nut.

29. The hairy caterpillar, *Euproctis scintillans* W. (family Lymantridae) feeds in groups on the inflorescence and tender nuts. Occasionally they eat the leaves also. It occurs on the mango and other plants.

30 The red grain bettle (*Tridoleum castaneum* h.)
31 The saw toothed beetle (*Oryzaephilus surinamensis* L.)
32 The red legged ham beetle (*Necrobia rufibes* F.)
33 The cadelle bettle (*Sepebroides mauritanicus* L.)
34 The Fig moth (*Ephesiia cantella* N.)
35 The Indian meal moth (*Plodia interpunctata* H.)

} Damage cashew kernels in storage.

DISEASES.

1. *Die-back or pink disease* (*Pellicularia salmonicolor*).—This disease has been observed in Thanjavur and Tiruchirappalli districts. The younger trees of two to three years old are more susceptible to the attack. The disease is characterised by the yellowing of leaves which fall off later on presenting a " stag head " appearance. The dried portion of the stem is covered by a pinkish coating which encircles the shoot causing the death of the branch. The progress and spread of the disease depend upon the atmospheric moisture prevailing at the time.

Control.—The diseased branches should be removed by cutting back until the healthy portion is reached. The cut ends should be covered with Bordenux paste.

2. *Shoot and inflorescence drying* (*Glocosporium mangilerae*).—This disease is noticed in all cashew growing areas. The injuries caused by the tea mosquito (Heliopeltis) appear to be the initial cause of the disease. *Glocosporium mangiferae* affects the wounded portions and irregular brown water soaked spots are produced on the tender shoots, inflorescence and leaves. Many sopts conlesce together resulting in the drying up of the affected portions.

Control.—Spraying 1 per cent *Bordenux* mixture after controlling the insects will control the disease.

3. *Apple rot and nut spettings* (*Glocosporium mangiferae and macrophoma* sp.).—Circular depressed and brown spots are caused by *G. mangiferae* while *Macrophoma* sp. produces irregular brown water soaked spots. Both the fungi infect the tender nuts producing brown spots. The affected nuts become black in colour.

Control.—Spraying with *Bordeaux* mixture (1 per cent) or other copper fungicide before the apple ripens or the nuts mature, will control the disease.

4. *Seedling blight* (*Fusarium* sp.).—The symptoms of the disease are yellowing of young leaves which loose their turgidity and wilting of the whole plant subsequently. Rooting of the collar region of the infected plant is seen and the roots become fibrous.

Control.—Breaching the soil with 0.1 per cent wet ceresan or 1 per cent *Bordanux* mixture, when the first symptoms of wilting is seen, will check the spread of the disease. A second drenching may be beneficial in cases of severe attack of the disease.

Leaf spot diseases :

5. *Grey blight* (*Pestalotia dichaeta*).—This disease occurs in severe forms in the drier months of the year. The leaves which are directly facing the sun's rays are more susceptible than the rest. The spots caused by the disease appear on both surfaces of the leaves and start either from the margin or from the centre. The affected portions show drying.

6. *Brown leaf spot* (*Collectotrichum glocosporidesi*.—The spost are brown with deeper coloured margin. They may be circular or irregular. The fructification of the fungus are greyish in colour.

7. *Grey spot* (*Mycospherella* sp.).—Irregular brown spots with grey centre are formed on both surfaces of the leaves. The fructifications appear as small raised dot like bodies which consist of many perithacia. These spots cause drying up of infected portions.

8. *Red leaf spot* (*Phyllosticta* sp.).—The spots are circular and brick-red in colour. Shot holes are formed when the affected portions fall off. The pycnidia are seen as dark brown slightly raised bodies. Badly affected leaves are crinkled and dry up.

9. *Leaf spot* (*Labridium* sp.).—The spots are light brown with grey centre on the upper surface. The pycnidia are produced on the upper surface.

10. *Red rust* (*Cophaleuros mycoidae*).—This is an algal parasite causing an infection up to 25 per cent of cashew plants. The disease is characterised by the circular orange, yellow algal growth on the leaves. Many spots coalesce together resulting in the discoloration of the tissues.

Control.—A general spraying of 1 per cent Bordeaux mixture or other copper fungicides will control all the above mentioned leaf spot diseases. When the trees put up new growth of shoots, the spraying should be taken up. A second spraying after three to four weeks may be effective if the disease is severe.

11. *Decline of cashew* (*Pythium spinosum*).—This disease is characterised by progressive defoliation and drying of the twigs during summer months. The infected trees die within two or three years. The roots are dark brown and fibrous. The infection seems to take place in the rainy season.

Control.—Drenching the soil with chestnut compound (1 oz. to 2 gallon water) gives good control of the disease. Application of compost, ammonium sulphate and super phosphate after drenching induces the trees to grow vigorously.

12. *Powdery mildew* (*oidium anacardii*).—This disease occurs during the dry weather and infects the tender leaves and inflorescences. The white powdery growth of the fungus is seen on the affected portions.

Control.—Dusting with fine sulphur controls the disease.

Phanorogamic parasites :

1. *Loranthus*.—The parasite is seen as a bushy dark green growth on the branches of cashew. The parasite sends haustoria into the host plant to absorb nutrients and the affected branches have very few leaves showing the symptom of die back.

2. *Cuscuta*.—This parasite has greenish thread like stem which encircles the twigs. Haustoria serve as the organ of attachment and absorption of food materials from the host plant. This parasite affects the general growth and yield.

Control —Since the Phanerogamic parasites are notified only in the neglected gardens, field sanitation will prevent the occurrence of such parasites. They should be cut and removed when they are noted.

APPENDIX IV-B.

PEST AND DISEASES OF CASUARINA AND THEIR CONTROL.

A-Pest.

1. *Ants*.—They carry away the seeds in the process of drying, storing and in the nursery. Addition of camphor or an insecticide powder white storing will keep away the ants.

2. *White Ants*.—They attack young seedlings after germination and after planting. spraying BHC 10 per cent of gamaxene or aldrin 1 per cent and other termicide will prevent the white ant attack.

3. *Crickets*.—*Crickets like Brachytrypes*, *achatinus*, *portentosus* and the mole cricket *Gryllotalan* species sometimes cause serious damage to the seedlings in the nursery. Using a suitabie wire mesh (1 cm. or less) around the nursery bed or hand picking the crickets during the nights with the help of the bright lamp is considered.

4. Borers, phossus malabaricus is said to bore the stems close to the ground. Plugging the bore holes with a blob of tar is effective in killing the caterpillar in the gallery. Badly affected plants require immediate extraction.

5. *Bag worms*.—These are destructive to seedlings in hot weather. Copious watering or spraying with crude oil emulsion will eradicate the pest.

6. *Beetles*.—The grub of *Coclosterna scabrator* attacks by boring in the roots. The cutting, uprooting and removing of all the attacked trees is the best way of eradicating the pest.

B-Diseases.

The black fungus *Trichosporium vesiculosam* does great damage to the plantation. The extraction of all dead and dying trees expeditiously and burning them away from the plantation and working the soil at the end of each rotation will reduce the attack.

APPENDIX IV-C.

LIST OF PESTS AND DISEASES OF COCONUT AND REMEDIAL MEASURES SUGGESTED.

A—*DISEASES* :

1. *Diseases of the bud.*

Description of the disease. (1)	*Symptoms.* (2)	*Remedial measures suggested.* (3)
1. *Bud rot.*—It is due to the primary infection in or near the bud tissue. It affects the young growing parts in the crown namely the central shoot. The disease is caused by the fungus Phytophthora Palmivora.	Symptoms of the disease consists in the pale colour, binding over, browing and breaking down of the central shoot. Sometimes two or more of the young leaves lose colour and droop before the central shoot breaks down. The withered heart leaf can be drawn right out by exerting a slight pull. Gradually the leaves in the surrounding whorl loose their green lustee and become dull yellow and brown indicating that rotting has further extended. Consequently the outer leaves and spathes enclosing the central spindle fall off leaving a ring of fully expanded leaves standing and retaining their colour many months. The softer infection portion will be completely rotten and degenerated to a slimy mass emitting foul smell. The palm succumbs with the death of the only vegetative bud.	Cutting and burning of badly infected trees on the spot. Application of Bordearix paste on theer own after thorough cleaning. The wounded and treated portion should be given a protective covering till the next emergins shoot comes out normal. A prophylactic spray of Bordeanux mixture to the apparently healthy palms adjacent to the diseased ones.
2. *False bud rot or lightning injury.*—This form of bud rot is characterised by the central shoot and the bud being affected only after the outer leaves have died.	The roots due off without showing particularly noticeable symptoms. The stem tissues remain soft but coloured deep salmon pink with patches of mustard yellow tissue prominently intermingled.	

APPENDIX IV-C—*cont.*

LIST OF PESTS AND DISEASES OF COCONUT AND REMEDIAL MEASURES SUGGESTED.

A—DISEASES—cont.

1. *Diseases of the bud.*

Description of the disease. (1)	*Symptoms.* (2)	***Remedial measures suggested.*** (2)
The crown gross sparce and thin and allows an easy entry of bud rotting organisms which completely disorganise the bud tissue. The central leaves are attacked last with all the other leaves collapsed and a single central leaf remaining stiff and upright.	In the young palms the discolouration extends up the stem in the typical 'cone' characteristic of a slowly progressing organism. In older palm the wood is hard, discoloured dull red with the vascular bundles showing an abnormal lignification. The affected palms are usually found around the area of lightning strike. The injured palms have a dried up appearance, the dried up fronds often have the peholes split transversely which hand down loosely. Marasmius palmivorus, Fomes Species and polyporus species cause secondary effect of stem and root rot leading to the rotting of bud.	
B—*DISEASES AFFECTING THE LEAF* :		
3. *Leaf rot.*—The disease is caused by the fungus *Gliocladium roseum* affecting the tender leaflets. The central spindle also gets infected. The leaf lamina gets destroyed due to the attack of the disease.	The first symptom of the disease is a blackening and shivelling up of the distal ends of leaflets in some of the inner whorls of leaves. On drying up, these are borken off in bits by the wind and the infected leaves assume a fan like appearance which is characteristic of the disease. Reddish brown spots and patches appear on the tender leaves and these penetrate to some distance into the interior of the shoots. The spots enlarge in size and a soft rot of the central shoot is gradually developed, the rotten portions dry up and turn black and fall of in the wind.	Spraying the crown and leaves with Bordeaux mixture or copper fungicides are advocated.

APPENDIX IV-C—*cont.*

B—DISEASES AFFECTING THE LEAF—cont.

List of pests and diseases of coconut and remedial measures suggested.

1. *Diseases of the bud.*

Description of the disease. (1)	*Symptoms.* (2)	*Remedial measures suggested.* (3)
4. *Bitten leaf disease.*—This disease is mainly confined to the foliar (leaf) portion.	The younger green unfolded and unfolding leaves appear bitten off at the ends or show successive leaflets lower on the stalks as broken or reduced to stumps.	
	These nearest to the heart leaf shows spots on successive green leaflets which bend over and break and hand down at these points. Leaves just pushing up have black tips. Infection usually starts as a yellow discolouration with a brown edge along a narrow live beside the ribs of the leaflets and runs across all leaflets overlapping at that point. If the infection is high up, only the tips of leaflets become black. As the leaves get mature, the leaf stumps become dark and gummy.	Cutting down and burning the infected leaves and the application of Bordeaux mixture to the foliage have been advocated as control measures.
5. *Petrole rot.*—This disease is not common. The softening of the mid rib is stated to be caused by Phytophthora.	The leaflets turn yellow and start dying from the tips downwards. The affected leaves soon dry up. Older leaves are affected first. Large dark brown, sunken lesions are found on the mid rib on both the surfaces, softening the tissues and resulting either in its breaking at the point of infection or hanging down by the side of the stem. Exudation of gum is a visible symptom of the disease.	Wrapping the affected limbs in dried banana and coconut leaves and setting fire to them.

APPENDIX IV-C—*cont.*

B—DISEASES AFDECTING THE LEAF—cont.

LIST OF PESTS AND DISEASES OF COCONUT AND REMEDIAL MEASURES SUGGESTED.

1. Diseases of the bud.

Descripiion of ihe disease. (1)	*Symptoms.*	*Remedial measures suggested.* (2)
6. *Leaf break disease.*—This disease is caused by the fungus Botryodiplodia species in palms lacking vitality and is characterised by the breaking of the leaves at about half its length. This disease attack the palms which have been subjected to other diseases. The entry of the organism is through wounds and dead tissues.	The apical leaves break at about the middle and the broken terminals hand vertically downwards. Brown discolouration develops the terminal leaflets and extends on to the mid rib which latter turns black. This discolouration spreads rapidlyalong the mid rib causing the decayand death of pairs of leaflets in quick succession.	Control measures recommended are the cutting and burning of infected leaves, the application of Bordeaux spray to the foliage, improved drainage manuring and better cultivation.
7. *Gray leaf spot or blight.*—This is a common disease found in coconut palms reducing the general vitality of the palm caused by *Pestalotia Palmuram.* The fungus penetrates the coconut palms when it tissues are tender and slowly establishes as a parasite. On the upper leaf surface black pycaidia of the fungus are formed.	Symptoms of the disease are confined to the outer whorl of leaves, i.e., mature and older leaves. Minute yellow spots encircled by greyish hand on the leaflets appear. Gradually the centre of these spots turns greyish white and the brown band darkens. Several of the spots coalesce into irregular, grey necrotic patches. In advanced stages tips and the margins and at times the whole leaflets dry and shrivel giving the leaf a burnt appearance.	Improving drainage conditions the application of Pottassic fertilizers and spraying the foliage with Boradeaux mixture are recommended as control measures.
8. *Thread blight.*—The fungus remains superficial on the leaflets. This disease is caused by the fungus *Corticum penicillatum* which remains superficial on the leaflets. It grows and spread along the under surface of the mid rib in the form of slightly raised card like strands. Ultimately the fungus ramifies the entire under surface and forms a thick of hyphae. On maturity the mycellum turns brown.	White patches appear on the upper surface of the leaflets in sharp contrast with the normal green shade of the neighbouring region and these leaves are shed prematurelly. In very serious cases, depliation of about 1/3 of the crown takes place attended by an immediate reduction in yield.	The control measures advocated are cutting and burning of the affected leaves, spraying with Bordeaux mixture.

APPENDIX IV-C—*cont*.

B—DISEASES AFFECTING THE LEAF—cont.

LIST OF PESTS AND DISEASES OF COCONUT AND REMEDIAL MEASURES SUGGESTED.

1. *Diseases of the bud.*

Description of the disease. (1)	*Symptoms.*	*Remedial measures suggested.* (2)
9 *Leaf fall or leaf drop.*—This is caused by the species of fungus Phytophthora.	Abnormal drooing of the lower leaves which gradually dry up and fall. In extreme cases about 1/3 of the total number of leaves hang down resulting in premature nut fall and button shedding. The bases of the drooping leaves are swollen and present soft discoloured patches.	
	C—Diseases Affecting the fruit.	
10 *Immature nut fall.*—Premature fall of nuts is a common feature in coconuts which is stated to be caused by physiological factors depending on soil and weather conditions i.e., inadequate soil moisture, excessive moisture, water logging of the deficiency of any of the major nutrients.	Immature nuts are shed with their stalk ends discoloured. The discolouration may extend upto the point of attachment of the nut to the inflorescence axis. Kernel of the affected fruit is rotten.	Application of nitrogenous manures is suggested as remedial measure.
11 *Fruit rot.*—This disease is frequently common in coconut palms leading to loss in yield. Caused by *Phytophthora omnivora*. The infection takes place on tender tissues and decay sets in leading to the shedding of the nuts.	Rotting of the immature nuts is the chief symptom of the disease. The affected nuts fall down. Near the stalks a discoloured area is developed which will appear at first water soaked and darker green than the rest of the surface of the nut. Later on, the lesions turn brownish in colour and appear as depression due to the decay of the underlying tissues. The pathogen appears as a whitish patty growth on the surface. The rot extends into the husk and often even into the endosperm cavity if the shell has not hardened.	Spraying with Bordeaux mixture during the premonsoon and postmonsoon periods are advocated. In addition to spraying a thorough cleaning of crowns of the palms is also desirable. The shed nuts should be Collected and burnt.

APPENDIX IV-C—*cont.*

C—DISEASES AFFECTING THE FRUIT—cont.

LIST OF PESTS AND DISEASES GF COCONUT AND REMEDIAL MEASURES SUGGESTED.

1. *Diseases of ihe bud.*

Description of the disease. (1)	*Symptoms.* (2)	*Remedial measures suggested.* (3)

Control measures for the crown diseases are summarised below :—

(1) Eradication of the diseased materials and their destruction on the spot.

(2) Application of copper fungicide such as Bordeaux mixture, as spray or past on the infected and woundes surface, Preferably during the pre-monsoon **and post-**monsoon periods.

(3) Prophylactic spray application of the fungicide on the apparently healthy neighbouring palms.

(4) Regular cultural and manurial practices to maintain the palms in normal vigour.

D—Diseases Affecing the Stem.—

12. *Stem bleeding.*—This disease is caused by the fingus *Thielaviopsis paradoxa*. A general rot of the soft inner tissue takes place, leading to the formation of a activity in the central portion of the stem and an accumulation of a thin yellowish fluid. The fluid gushes out when the cavit is opened.	The characteristic symptom of the disease is the exudation of a dark reddish brown fluid from cracks in the outer tissue usually found at the lower portion of the trunk about 2m—3m from the ground. The fluid turns black in colour as it dried up on the bark. The tissues beneath the bleeding patches become decayed and yellowish. The infection may occur anywhere in the trunk.	The disease can be checked by completely removing the infected material by cutting it out by means of a chisel and dressing the wound with tar of Bordeaux paste.

E-Diseases Affecting the Root.

13 *Ganoderma lucidum* is the fungus causing the root disease in coconut.	The older leaves start drooping and withering and remain suspended arround the trunk for several months before they are shed. Younger leaves remain green for sometime.	Application of sulphur and lime to the trees was found to be efficacious.

APPENDIX IV-C—*cont,*

E—DISEASES AFFECTING THE ROOT.

LIST OF PESTS AND DISEASES OF COCONUT AND REMEDIAL MEASURES SUGGESTED.

1. *Dieases of the bud.*

Description of the disease. (1)	*Symptoms.*	*Remedial measures suggested.* (2)
	The tree becomes barren due to the suppression of the inflorescence.	
	The crown is reduced in size and the new leaves produced are successively smaller and yellowish in colour which finally wither as the bud decays.	
14 Brown root diseases is caused by the fungus *Fomes noxius*.	The bole when cut open shows a honey combed appearance, pale yellowish brown in colour and is light and tindery.	Adoption of sanitary measures to eliminate infection and maintenance of favourable soil conditions are suggested.
	F. Wilts.	
15 *Wilt disease* :	The characteristic symptoms of the disease are general wilting of the leaves, flaccidity and ribbing of leaflets and necrosis of leaf tiss. As the disease advances the whole crown gets smaller due to a reduction in the number and size of the leaves.	
	In some cases if the tree is bearing shedding immature nuts is an initial symptom.	
	In advanced stages the crown gets very much reduced in size. ceases to produce flower branches and finally succumbs to the disease.	The infacted trees should be cut and burt. General improvement of the cultural and manural practices might mitigate the disease to a certain extent.

B. Pests.

The coconut palm is attacked by a number of insect pests at all stages of its growth. The details of insect pest and the various control measures are given below :—

Particulars of pest. (1)	*Symptoms.* (2)	*Control measures suggested.* (3)
1. The Phinoceros beatle (oryctes rhinoceros order coleoptera) family Scarabaeidae sub-family Dynastinae is one of the major pests of the coconut palm. *Egg.*—The egg when freshly laid is globular white in colour 2·5 mm x 3·5 mm in size and fairly Hard shelled. *Larva.*—The larva is yellowish white in colour and measures about 6 to 7 mm in length. The head and three pairs of legs turn brown. When half grown the colour of the larva changes to dark grey. The full grown larva is ash grey in colour with brownish hairs. Pupa is brown in colour slightly convex dorsally size 50 to 70 mm in length with 20 to 25 mm in width. Adult is black in colour varying from 35 to 50 mm in length 14 to 20 mm in width. Male has got a cephalic horn.	The adults attack the young folded leaves and infested trees receive a serious set back and even die.	Mechanical control is by tackling the breeding places of the beetle and destroying its earlier stages of development of eggs, grubs and pupae and direct method of examining the palms periodically and extracting out the beetle by means of a hooked pointed rod.
2. *Xylotrupes gideon L.* The male is about 45 mm. in length and is chetnut coloured. The heed is armed with a horn projecting forward and terminating in two recurved points. The female is generally reddish-brown in colour and smaller than the male and has no projections from the head.	It feeds on the under surface of the leaf petroles and as a result the apical portion of the leaf breaks down. This leaf-break is an indication of this beetle.	Control measures as described for *Rhinoceros* beetle.

B. Pests.

Particulars of pests. (1)	*Symptoms.* (2)	*Control measures suggested.* (3)
3. *The Cockchafer:—* (*Leucopholis coneophora Burm*) (Family Melolonthidae)—The larvae of the pest feed on the roots of the coconut palms and cause untold havoc. *Egg.*—The larvae are white with brown heads and flushy bodies. The mandibles and maxillae are strongly built and well developed. The head is prominent downwardly inclined and strongly chitinized. Fully grown grubs measure about 60 mm. in length and 12 mm. in width. *Pupa.*—Pupae are brown in colour and slightly convex dorsally. The legs and wing cases are distinctly folded on the neutral surface. The pupa varies in size from 30 mm. to 50 mm. in length to 15 mm and 25 mm. in width. *Adult.*—The adult beetles are chestnut coloured about 30 mm. in length and 14 mm. in width. Males are smaller than the females. In females the abdomen is broader posteriorly while in the male it is uniformly narrower both nuteriorly and posteriorly. The tubial spurs of the hind legs in females are broader towards the apex, while those of the males are more slender and pointed.	The leaves of the attacked palms turn pale yellow and there is reduction in the formation of nuts. During periods of heavy attack the immature nuts fall off from the stalks and the palms appear quite barren. In young coconut palms in growth is stunted and the flowering delayed.	Birds are the most important predators of the larvae of the pest. Common crow, dogs, cats and bats stripped squirrels eat the adult beetles and grubs. Application of BHC and DDT to the soil at 45 kg. of 10 per cent per ha. once a year gave control of the pest. 5 per cent chlordane dust applied at 25 kg. per ha. also gave satisfactory results. The insecticide is applied to the soil by a hand duster and the soil is either titled or ploughed up to 15 cms. deep.

B. Pests.

Particulars of pest. (1)	*Symptoms.* (2)	*Control measures suggested.* (3)
4. *The red palm weevil (Rhynchophorus ferrugineus)*.—It is the most destructive pest of young coconut palms. *Egg*.—The eggs of the weevil are creamy white in colour, long oval in shape and slightly broader at one end and are 2.62 mm. long and 1.12 mm. wide. *Larva*.—The full grown grub is a conical shaped larvae bulged in the middle and pointed towards both ends. The larva is stout, fleshy and apodal. The head is brown in colour and pointed downwards. *Cocoon*.—The cocoon is oval in shape from 50mm. to 95 mm. in length and 25 to 40 mm. width. The interior of the cocoon is smooth and is plastered with a dark coloured solution. ***Pupa*.—The pupa is at first cream coloured but later turns brown. Its surface is shiny, but greatly furrowed and reticulated with a length of 35 mm. and width of 15 mm.** ***Weevil*.—The adult insect is a ferruginous brown cylindrical weevil with a long prominent curved snout of 35 mm. in length and 12 mm. in width. The head and rostrum comprise about ⅓ of the**	It is very difficult to detect the pest in the early stages of attack. The grub begins its life inside the palm and normally nevercomes outside. Hence neither the grub nor the damage caused by it can be readily seen. Sometimes a few small holes occur in the crown or the soft stem from which pieces of chewed fibres protrude and a brownish viscous liquid comes out. In many cases the drying up of the young heart leaves or splitting of the petroles near the area of attack can be observed. But most often the attack by the weevil is noticed only when the tree has been fatally is fested and is beyond repair.	Preventive and mechanical measures suggested are:— 1. scoping out of the grubs mechanically and dressing the wounds with repellants like tar, lime, etc., are suggested as control. 2. Trees in which the grubs had gone deep should be cut and burnt. 1 per cent Pyrocon E (a mixture of one part of phyrethria and 10 parts of piperonyl is butoxide) in water when injected into the infested trees gave the best results. Depending upon the severity of attack 1000 cc. to 1500 cc. of 1 per cent pyrocon-E should be poured through a funnel fixed in a hole little above the infested por tions. After the insecticide had percolated into the palm the hole should be closed by cement. As a prophylactic control measure the leaf axils of young palms should be filled up with sand and 5 per cent BHC or sand and **5 per cent chlordane in equal proportions**.

B. Pests.

Particulars of pest. (1)	*Symptoms.* (2)	*Control measures suggested.* (3)
total length. In the male, the dorsal apical half of the snout is covered with a patch of short brownish hairs. The snout of the female is bare, more slender curved and little longer than that of the male. (N. B.—Pyrocon can be obtained from Bombay chemical Company Ltd., No. 129, Mahatma Gandhi Road, Fort Bombay.)		
5. *The coconut caterpillar* (*Nephantis serinopa Meyr*) (Lepidoptera family cryptophasidae).— *Egg.*—Freshly laid eggs are creamy white in colour B oval in shape 0.6 mm. to 0.8 mm. long and 0.3 mm. to 0.4 mm. wide. Before hatching the egg gradually turns pinkish incolour. *Larva.*—Larvae are cylondrical but a little compressed. The posterior end is slightly tapering. The anterior part of the body is broader than the rest of the abdomen. The larvae can be identified by the presence of reddish brown stripes one on the dorsal side and two each on lateral sides. *Pupa.*—The pupae are some what flattened dorsoventrally tapering posteriorly and blunt at the nuterior end. These are light brown and translucent becoming darker and opaque as they develop.	This is serious pest and the larvae of the pest live on the under surface of the leaves in galleries and feed on the green tissues. The injury by numerous larvae causes the foliage to dry up and when many fronds are affected, the tree suffers considerable damage with the result that yield is reduced.	Infested leaves should be cut off and burnt Spraying of 0.2 per cent DDT is efficaceous.

B. Pests.

Particulars of pest. (1)	*Symptoms.* (2)	*Control measures suggested.* (3)
Adult.—The adult is a medium sized both measuring 10 to 15 mm. with a wing spread of 20 to 25 mm. The head and thorax are light greyish ochreous in colour. The male moth is smaller with a slender abdomen and have tuft of hair at the hind wing while in the female the abdomen is stouter and pointed at the tip.		
6. *The spin slug.* (*Macroplectra mararin Moore.*)—The adult is a pale brownish ochre colored moth. The basal 2/3 portion of the forewing in red in colour, while the outer border is brown. The eggs are laid singly on both sides of the leaves. The full grown larvae is 8 mm. to 11mm. in length and is yellowwish green dorsally and pinkish centrally. The cocoon is spherical and purplish brown in colour. The pupa is about 6 mm. nlength stout and roughly oral.	It attacks the coconut palms and causes extensive damage to the leaves.	Spraying of lead arsinate or 0.2 percent DDT give satisfactory results.
7. *The coconut scale* (*Aspidiotus destructor sign*) (Homoptera).— The female scale is nearly circular in outline, semi transparent and Pale brown in colour.	The pest feeds mainly upon the underside of the leaflets. At times it forms a continuous yellow crust all over the underside of the leaflets. It causes premature death of the leaflets by sucking their sap.	
	Attacked leaves first turn yellow, then wither and die and a reduction attacked leaves first time.	Parathion at 0.025 per cent is generally used for the control of the cale insects.

B· Pests.

Other pests.

Particulars of pest. (1)	*Symptoms.* (2)	*Control measures suggested.* (3)
8. *Rat.—(Rattus rattus Bl)* is the species commonly found attacking coconut palms.	Rats causes serious damage to young palms by eating the growing stem, resulting in the complete collapse of the young palms.	The use of poisoned bait fumigation of the rate burrow trapping, application of chemical repellants and encouragement of the natural enemies are some of the measures suggested for the control of rates.
9. *The Flying Box* or the *fruit eating bat. –(Pteropus medium and pteropus vampyrus order* chiroptern family pteropodidae.	It is a serious pest of coconut palms. Just after sim set, the bat alights on the crown of a palm and moves to the bunch by hanging on the leaf that subtends the bunch. The husk and tender shell are butten off and a wide hole is made. The bat drinks the sweet water and afrerwards feeds on the kernel. Generally the heavy bearing tall palms are selected and regularly visited by bats.	It is difficult to control the pest except by direct shooting.

APPENDIX V.

STATEMENT SHOWING THE FOREST OFFENCES AND COMPOUNDING FEES REALISED IN THANJAVUR FOREST DIVISION FROM 1956 TO 1970.

Year.	*Nature of Offence.*			*Total.*	*Compounding fees realised.*
	Illicit felling.	*Grazing.*	*Other offences.*		
(1)	(2)	(3)	(4)	(5)	(6)
					RS. P.
1956–57	**24**	**6**	**Nil**	**30**	**Nil**
1957–58	**186**	**49**	**9**	**244**	**782·00**
1958–59	**288**	**40**	**1**	**329**	**1,156·00**
1959–60	**424**	**22**	**2**	**448**	**273·00**
1960–61	**361**	**29**	**4**	**394**	**521·00**
1961–62	**655**	**44**	**10**	**709**	**1,270·00**
1962–63	**316**	**58**	**188**	**562**	**2,027·00**
1963–64	**267**	**47**	**12**	**326**	**1,159·00**
1964–65	**180**	**40**	**173**	**393**	**1,050·00**
1965–66	**263**	**89**	**41**	**393**	**1,845·00**
1966–67	**226**	**66**	**15**	**307**	**1,111·00**
1967–68	**204**	**153**	**23**	**380**	**1,247·00**
1968–69	**232**	**213**	**14**	**459**	**1,983·00**
1969–70	...	...	...	...	**2,870·00**

APPENDIX VI.

STATEMENT SHOWING THE GRAZING REVENUE REALISED AND THE GRAZING INCIDENCE OF THANJAVUR FOREST DIVISION FROM 1956–57 TO 1969–70.

Serial number.	*Year.*	*Grazing revenue realised.*	*Number of cow units for which permit issued.*	*Area opened for grazing in hectares.*	*Area closed for grazing in hectares.*	*Grazing in incidence per cow unit in hectares.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)
		RS. P.				
1	1956–57	55·12	222	18024·32	24·00	81·19
2	1957–58	1,027·00	4,108	18,000·00	75·00	4·38
3	1958–59	1,300·00	5,200	17,295·00	731·32	3·33
4	1959–60	1,486·25	5,945	17,087·00	937·32	2·09
5	1960–61	1,359·75	5,439	16,930·00	1,094·32	3·11
6	1961–62	1,083·00	4,332	16,820·00	1,204·32	3·84
7	1962–63	1,282·00	5,126	17,186·00	838·32	3·35
8	1963–64	1,365·75	5,473	16,838·00	1,186·32	3·08
9	1964–65	2,618·50	5,237	16,520·00	1,504·32	3·15
10	1965–66	2,847·00	5,694	16,318·00	1,706·32	2·86
11	1966–67	2,669·00	5,338	16,820·00	1,804·32	3·15
12	1967–68	2,979·00	5,958	17,100·00	924·32	2·87
13	1968–69	3,343·00	6,686	16,982·00	1,042·30	2·54
14	1969–70	2,789·50	5,579	14,921·32	3,121·17	2·67

APPENDIX-VII.

MAMMALIA.

1	Balck buck or Indian antelope	*Antilope cerricarna*
2	Bonnet macque	*Lacaca radiata*
3	Black maped hare or Indian hare	*Lapur aigricollis*
4	Chital or spotted deer	*Axix axix*
5	Common mangoose	*Hernestes edwardri*
6	Fruit bat	*Cynopterus sphiax*
7	Jackal	*Canis aureus*
8	Small Indian mangoose	*Herpestes auropunctatus*
9	Wild boar	*Sus scrofa*
10	Wild dog	*Cusa alpiaus.*

REPTILLIA.

1	Brown speckled whip snake	*Dryophis pulveruleatus*
2	Bridal snake	*Dryocalamus aympha*
3	Carpet snake	*Morelia variegata*
4	Common water snake (Dhaman)	*Zameasi mucusus*
5	Common green whip snake	*Dryophis mycterizans*
6	Common wolf snake	*Lycodon aullucus*
7	Common pond snake (Keelback)	*Tropidonotus piscator*
8	Commonkrilat	*Bungarus caeruleas*
9	Common Indian coral snake	*Membibuagaurs aigresceas*
10	Cobra	*Main tripudians*
11	Chain viper	*Vipera spp.*

BIRDS.

1	Ashy wren warbler	*Prinia socialis*
2	Ashy swallow shrike	*Artamus fuscus*
3	Ashy drongo	*Decrurus caerulescens*
4	Avocet	*Recuryirostia avesetta*
5	Bay backed shrike	*Lanius vittatus*
6	Bar headed goose	*Ancer indicus*
7	Bar tailed godwit	*Limosa lappnica*
8	Billed kingfisher	*Pelargopsis capensis*
9	Black drongo	*Dicrurus adsimilis*
10	Blackwinged kite	*Elanus caeruleus*
11	Blossom headed parakeet	*Psittacula cyanocephala*
12	Blue winged parakeet	*Psittacula columboides*
13	Blue rock pegion	*Columbia liviagmelin*
14	Black headed shrike	*Coracina melanoptera*
15	Black headed gull	*Larus ridi bundus*
16	Black tailed gadait	*Limosa limosa*
17	Black winged stilt	*Himantopus himatopus*

BIRDS—*cont.*

18	Black bellied tern	*Sterna acuticauda*
19	Black bellied finchlark	*Erempterix grisea*
20	Born owl	*Tyte alba*
21	Brahminy kite	*Haliasture indus*
22	Brahminy myna	*Sturnus pagedarum*
23	Brown fish owl	*Bubo zeylonesis*
24	Broad billed sandpiper	*Limicola felsinellus*
25	Bush lark	*Mirsfr assraica*
26	Button quail	*Turnix tanki*
27	Caspion tera	*hydroprogne caspin*
28	Cattle egret	*Bubulcus ibisu*
29	Chestnut headed bee eater	*Merops leschenaulti*
30	Chestnut bellied muthatch	*Sitta castanea*
31	Chestnut bittern	*Ixobrychus cinnamomeus*
32	Common myna	*Acridentheres tristis*
33	Common babler	*Turdeides caudatus*
34	Common green bee eater	*Mereps orientalis*
35	Common Indian night jar	*Caprimulgus asiaticus*
36	Common weavar bird (Baya)	*Ploceus phillippaus*
37	Common kingfisher	*Alcede atthis*
38	Common teal	*Anas crecca*
39	Cotton teak	*Nettapus coremandelianus*
40	Crow pheasant	*Centrepus sihensis*
41	Crested serpent eagle	*Spilernis cheela*
42	Crested lark	*Galerida cristata*
43	Curlew sandpiper	*Calidris testaccus*
44	Dabchick	*Pediceps ruficollis*
45	Dartor (Snake bird)	*Anhinga melanogaster*
46	Dunlin	*Erolia alpina*
47	Dull green leaf warbler	*Phyllescopus prochelsideaviridanus*
48	Eastern golean plover	*Pluvialis dominica*
49	Fan tail flycatcher	*Rhipidura albegularis*
50	Fan tail snipe	*Capella gallinage*
51	Flamingo	*Phoeni copterus roseus*
52	Gargany teal	*Anas querquedula*
53	Gadwall	*Anas strepera*
54	Golden plover	*Pluvialis*
55	Golden backed woodpecker	*Bracaypternus beghalensis*
56	Grey headed myna	*Sturnia malabarica*
57	Grey jungle fowl	*Gallus sonneratii*
58	Grey hornbill	*Tockus birostris*
59	Great horned owl	*Bubo bubo*
60	Grey patridge	*Francolinus pondicerianus*
61	pigeon Green	*Treron hoenicoptera*

BIRDS—*cont.*

62	Grey shrike	*Lanius excubitor*
63	Grey tit	*Parus major*
64	Grey wagtail	*Metacilla cinerea*
65	Greater blackheaded gull	*Larus inchthyaetus*
66	Grey heron	*Ardea cinerea*
67	Grey pelican	*Pelecanus philippensis*
68	Grey plover	*Pluvialis squatarola*
69	Great stone plover	*Esacus recurvirostris*
70	Green shank	*Tringa nebularia*
71	Green billed malkoha	*Rhopodytes viridirestris*
72	Gull billed tera	*Gelochelidon nilotica*
73	Hawk Couckoo (Brain fever bird)	*Ceculus varius*
74	House crow	*Carvus splendens*
75	House sparrow	*Passer domesticus*
76	House swift	*Apus affinis*
77	Roopoe	*Upupa epops*
78	Indian pitta	*Pitta brachyrura*
79	Indian pipit	*Anthus rufulus*
80	Indian robin	*Saxiceloidus fulicata*
81	Indian roller (Blue Jay)	*Coracias benghalensis*
82	Indian reef meron	*Egretta gularis*
83	Indian three toed king vulture	*Torgos calvus*
84	Indian moorhen	*Gallinula chloropus*
85	Indian cuckoo	*Ceculus Micrepterus*
86	Indian courser	*Curserius coromandelicus*
87	Iora	*Aegithina tiphia*
88	Jack snipe	*Lymnocrynts minimus*
89	Jerdon's chloropsis	*Chloropsis jerdoni*
90	Jungle myna	*Acridopheres fuscus*
91	Jungle crow	*Carvus macrorhyackos*
92	Jungle babler	*Turdeides striatus*
93	Kestrol	*Falco tinnunculus*
94	Kentish plover	*Charadrius alexandrinus*
95	King vurture	*Torgos calvus*
96	Koel	*Eudynamis scelopaceus*
97	Knot	*Calidris canutus canutus*
98	Large green bea eater	*Merops orientalis ceylonicus*
99	Large pied wagtail	*Metacilla maderaspatensis*
100	Large cormorant	*Phalacrocorax carbo*
101	Large sand plover	*Charadrine taschenavli*
102	Lesser black headed gull	*Larus ridibundus*
103	Little rown dove	*Streptovelia senegalensis*
104	Little cormorant	*Phalacrocorax niger*

105	Little tern	*Sterna albifrons sinensis*
106	Little ringed plover	*Charadrius dubius*
107	Little stint	*Calidris minutus*
108	Marsh sandpiper	*Tringa hypoleucos*
109	Magpie robin	*Copsychus saularis*
110	Night heron	*Nycticorax nycticorax*
111	Open billed stork	*Anastomis oscitans*
112	Orange minivet	*Pericrocotus flammeus*
113	Orange headed ground trush	*Geokichala citrina*
114	Oyster catcher	*Haematopus ostralegus*
115	Paler harrier	*Circus macrourus*
116	Palm swift	*Cypsiurus parvus*
117	Palla's fishing eagle	*Kaliaeetus leucoryphus*
118	Paradise flucather	*Terpsiphone paradisi*
119	Paddy field warbler	*Acrocophlus ugricols*
120	Painted stork	*Ibis leucocephalus*
121	Pied bushchat	*Ibis*
122	Pied kingfisher	*Ceryle rudis*
123	Pied creste cuckoo	*Clamator Jacobinus*
124	Pied ground thrush	*Geokichla wardii*
125	bintail	*Anas acuta*
126	Plaintiva cuckoo	*Carcemantis merulinus*
127	Pond heron	*Ardeola cinerea*
128	Pratincole	*Glareola lactea*
129	Purple sunbird	*Cinnyris asiaticus*
130	Purple rumped sunbird	*Cinnyris zeylonicus*
131	Redvented bulbul	*Pycaonetus cafer*
132	Red turtle dove	*Streptopelia anquebarice*
133	Red breasted flycatcher	*Muscicapa paya*
134	Red head merli	*Falco chicquera*
135	Red necked phalarope	*Phalaropus lobatus*
136	Red shank	*Tringa ochropus*
137	Red sea crested tern	*Talasseus bengalensis*
138	Ringed dove	*Streptopelic decaocto*
139	River tern	*Sterna aurantia*
140	Rain quail	*Cothuraix coromandelica*
141	Rose ranged parakeet	*Psittacula Krameri*
142	Rofous tailed flycatcher	*Muscicapa ruficanda*
143	Ruff an reeve	*Philom chus pugnax*
144	Ruddy sheldrake	*Tadorna ferruginea*
145	Scarlet minivet	*Pericratus flammeus*
146	Short toed eagle	*Circaetus gallicus*
147	Shikara	*Accipiter badive*

BIRDS—*cont.*

148	Shoveller	*Anas clypeata*
149	Sky lark	*Aluda gulgula*
150	Small minivet	*Pericrocetus cinnamomeus*
151	Spotted owlet	*Athene brama*
152	Spotted minia	*Urloncha punctulata*
153	Spot bill	*Anas poeci loryacha*
154	Spoon bill	*Platalea leucorodia*
155	Stone curlew	*Burhinus octicaemus*
156	Tailer bird	*Orthotomus sutorius*
157	Temminek' stint	*Calidris temminckii*
158	Thick billed warbler	*Pyhlloscopus procheleideaviridanus*
159	Tickle's flower pecker	*Dicaeum erythrorhynchos*
160	Three pie	*Dendrocitta vajabunda*
161	Turn stone	*Strep silas* (*Arenaria interpres*)
162	Verditor flycatcher	*Mu scicaea thalassina*
163	Whimbrel	*Numenius phaeopus*
164	White cheeked bulbul	*Molpaspes leucogenys*
165	White browed bulbul	*Pycaonotu s leteolus*
166	White breasted kingfisher	*Halcyon smyrnensis*
167	White backed vulture	*Gyps bengalensis*
168	White scavanger vulture	*Neophoron percaopterus*
169	White eye	*Zezterops palpebrose*
170	White billed drongo	*Deicrorus caerueescens*
171	White breasted sea eagle	*Halineetus leucogaster*
172	White breasted water bea	*Amaurornis phoenicurus*
173	White Throated Munia	*Uroloacha malabarica*
174	White backed munia	*Uroloncha striata*
175	White wagtail	*Motacilla alba*
176	White throat lesser	*Sylvia curruca*
177	Whiskered tern	*Chlidonias hybrida*
178	Whistling teal	*Dendrycygen javanica*
179	Whistling thrush	*Myophonus caeruleus*
180	Wire tailed swallow	*Hirundo smithi*
181	Wood shrike	*Tephrodornis pondicerianus affinus*
182	Yellow Throated sparrow	*Jymorhis zanthocollis*
183	Yellow wagtail	*Motacilla flaba*
184	Yellow wattled lapwing	*Vanellus malabaricus*

APPENDIX VIII.

A NOTE ON CASHEW-NUT SHELLING AND EXTRACTION OF CASHEW SHELL OIL.

Cashew-nut is an edible seed of *Anacardium occidentale* and it comprises of a hard and smooth outer shell and an inner soft, delicious and nutritious kernel which is a very valuable dollar earning produce. The raw nut olive green in colour when young. It becomes brownish in colour on maturity. The inner wall is not much thicker. Between this there is a honey comb structure containing a pale brownish oil which has an irritan effect on the skin. Cashew-nuts harvested from forest plantations and private patta lands are mostly purchased by the Tamil Nadu Cashew Factory situated at Gandarvacottai at the prevailing market rates. The market price per bag of 80 kg. of cashewnuts varies from Rs. 110 to Rs. 140.

At Gandarvacottai there is a private factory which processes the nuts and also extracts cashew shell oil. The shell oil extracted from cashew shell is commercially known as "Cashew-Nut Shell Liquide (C.N.S.L.)" which is an important source of natural pehnols and finds use as a lubricant and insecticide and in the production of plastics and electricals insulation, varnishes and in paints.

Shelling of cashew and separating kernels.—Breaking of cashew-nuts and separating cashew kernels is a trickish and cumbersome process which is done mostly by manual labour only.

Stock and stone method or hand shelling method.—In certain parts of Tamil Nadu (Panruti Senthurai, Andimadam, etc.) the cashew-nuts are thoroughly dried in the sun for two or three days and shelled without roasting. The nuts are beaten on the outer sides of the joint of the two shells near the micropyle side by keeping the nuts on a stone so that the shells easily split without damaging the inner kernel since the kernels in full sizes are more valued than the split ones. While breaking the shell some amount of oil called anacordic acid and anacordol is exuded which is corrosive in nature and cause blisters on the skin and stains the skin and cloth, etc. The mazdoors engaged in this operation smear their hands with a thick coating of wood ash so that their hands are protected from the damage of direct contact with shell oil. The nuts are generally broken when they are raw and kernels separated. The kernels after separation from the shells are graded into different qualities.

Cashew-nut is a seasonal crop and it is collected from the cashew plantations from March to June. The unts are dried in the see for few days to a low moisture content to avoid spoilags in storage and can be kept successfully in proper storage conditions for few years. Excess moisture attracts insects which penetrate to the kernel by boaring through the shell at the point where the stem connects. Hence in some factories the storage buildings are fumigated as a further precaution against insect attack The method adopted in Tamil Nadu Cashew Factory at Gandarvakottai for shelling the cathew-nut and separation of kernels from cashew is described below—

The method involves several processes such as:—

1. Soaking and pretreatment.
2. Roasting.
3. Mechine cutting of cashewnuts.
4. Manual decortication of kernels.
5. Processing of kernel.
6. Peeling of testa.
7. Selection and grading.
8. Packing.

Soaking and paeireanment.—

The amount of nut required for a days turn out (20 to 22 bags of cashew-nut each bag of 80 Kg.) is brought from the store and placed in bunkers or in heaps which is covered from the direct heat of the sun. Then they are transferred to a big trough containing water and thoroughly soaked in water for about 4 hours. Nuts ar seperated and sorted out as floating znce and sinking once. Then they are removed from the trough and heaped separately, floating one at one place end sinking once at other place and are allowed as such over night for bripping of water. The desirable moisture content is reported to be 15 to 25%.

Soaking of nuts prior to heating improves the yield of cashw-nut shell kiquid (CNSL) which is presumed to be expelled from the shell by the rapid volatslization of the absorbed water. Further it ensures nniform roasting without damaging the kernels.

Roastiug.—

The conditioned nuts are fed to revolving drum called roaster through a slit on the top and the drum is heated directly on an open fire by using waste cashews hells. Simultaneously the drum is rolled by a handle vhile heating. The rolling of roaster is done for abouut 15 minutes for floating nuts while in the case of sinking one it is for 20 minutes. On opening of the slit at the top of the roaster the roasted nuts are eventually disccharged at lower end through a slanting pall. Roasting is done becanse kernels from the roasted nuts are preferred. Roaetins is a delicate operation which should be done carefully because a slight under roating or over roasting adversely affects both the quality and recovery of kernels. Roasting adds ta the flavour and taste of the kernel.

Machine cutitng of cashew-nuts and manual separaiton af kernels.—

The roasted cashew-nuts after cooling are Sroken by cutting machines operated by manual labour. The cutting machine comprises of an anvil upon which the cashe-nuts aro placed and a pair of 'U' shapped cutting knives piaced back to back so that they form a commo wedge One of the blades is hinged and means provided to pull apart the two blades by pressure on a handgrip. The nuts ape placed on the anvil length-wise i.e. along the line of natural curvature and the handle is brought down. This action cuts the opposite side of the walls of the nut withont placing any strain upon the kernel. Further there is always a sufficient gap in between the anvil so that the kereel is not damaged. As the knife is lowered the blades act as a wedge and forces open the two halves The handgrip is then pressed and the shell is torn in half and opened along the natural curve of the nut. The hand machine is fitted with a root tredle so that both hands are free to handle the nuts. The operator has to lift his handle, cut the nut, then remove the kernel from the shell.

All these operations are done by a single man. In machine cutting 5 to 7 per cent kernels are broken into pieces. By machine cutting a man is able to separate kernels to the extent of 15 to 20 Kg. per day in a shift of 8 hours.

Processing the kernels :

The kernels are covered by a brownish testa which is difficult to remove even after roasting nuts and cutting by machine. The kernels separated from the shells are evenly placed in iron trays of fine mesh (100 mesh) and heated inan oven for about 4 to 5 hours for the purpose of easy peeling of the testa. The fuel used is waste shell which is cheap and economical. Iron trays are placed one over the other. Lower ones that are heated first are removed manually and replaced by fresh trays containing the kernels. In the oven at Gandarvacottai about 500 kg. of kernel can be put at a time. The kernel tends to shrink away from the testa under these conditions and the testa becomes brittle enabling easy peeling.

Peeling the testa :

Peeling of testa is done entirely by hand and during this operation about 15 to 20 per cent of the kernels are broken. It is said that each woman worker can peel about 5 to 7 kg. of kernels per shift.

After drying the kernels in the oven they become dry and brittle and in order to bring them to a suitable condition to withstand handling during transit, they are conditicned in a humid area for a few hours where they regain a moisture contant of about 5 per cent before being sorted out, graed and packed.

Sorting and grading :

The kernels after separation from the shells are sorted out and graded into different grades, by manual labour only. Women mazdoors are employed for sorting and grading and each of them will grade about 8 to 10 kg. per day and are paid at the rate of 0·25 kg. for grading.

Grading:

The cashew kernels are graded according to the size, colour and other characteristic such as full forms, splits, broken, bits, etc. The descriptionof grading is given below and a number is assigned to the grades like 210, 240, 320, 450, etc., which indicate the number of kernels per pound. The different recognised grades are as approved by the quality control scheme for cashew.

1. 210 Count Wholes	(W. 210)
2. 240 Count Wholes	(W. 240)
3. 320 Count Wholes	(W. 320)
4. 450 Count Who;es	(W. 450)
5. Scorched Wholes	(SW)
6. Scorched Wholes Seconds	(SSW)
7. Dessert Wholes	(DW)
8. Butts	(B)
9. Splits	(S)
10 Large White pieces	(LWP)
11. Small white pieces	(SWP)
12. Baby Bits	(BB)
13. Scorched Butts	(SB)
14. Scorched Splits	(SP)
15. Scorched Pieces	(SP)
16. Scorched Small Pieces	(SSP)
17. Scorched Pieces Seconds	(SPS)
18. Dessert Pieces	(DP)
19. Dessert Small Pieces	(DSP)

These are now almost absolete [280 Count Wholes—(W. 280) 400 Count Wholes (W. 400) 500 Count Wholes (W. 500)].

Packing :

Packing for export is done in square tins (20 litres capacity) with different grades each holding about 25 lbs. or 11·4 kg. of kernels. After the atmospheric air in the tin is vacumised carbon dioxide is infused into the tins in order to prevent the kernels from infestation and they are hermetically sealed. Vitapack type of machine is used for this purpose.

Cashew kernels are marketted to foreign countries like America, Australia, Japan, Singapore, London, etc. Kernels are also marketted for local consumption in tins which are not vacumised. Two tins are packed in cotton for export.

A bag of cashew-nut of 80 kg. gives about 18 to 22 kg. of cashew kernels depending upon the quality of nuts.

Cost particulars.

Purchase price of cashew (one bag of 80 kg.) from local market	Rs. 110 to 140.
80 kg. of nuts will give about 18 to 22 kg., i.e. on average of 20 kg.	
Selling price per kg. of kernel is	Rs. 12 per kg.
Cost of shelling and separation of kernels from the shell upto the final stage for 80 kg. of cashew-nut	Rs. 20
Selling price per kg. of cashew kernels	Rs. 12
Purchase price of cashew-nut per kg.	Rs. 1·50
Production cost of kernel per kg.	Rs. 0·25
Net profit per kg of. kernel	Rs. 10 on an average

Hand shelling method:

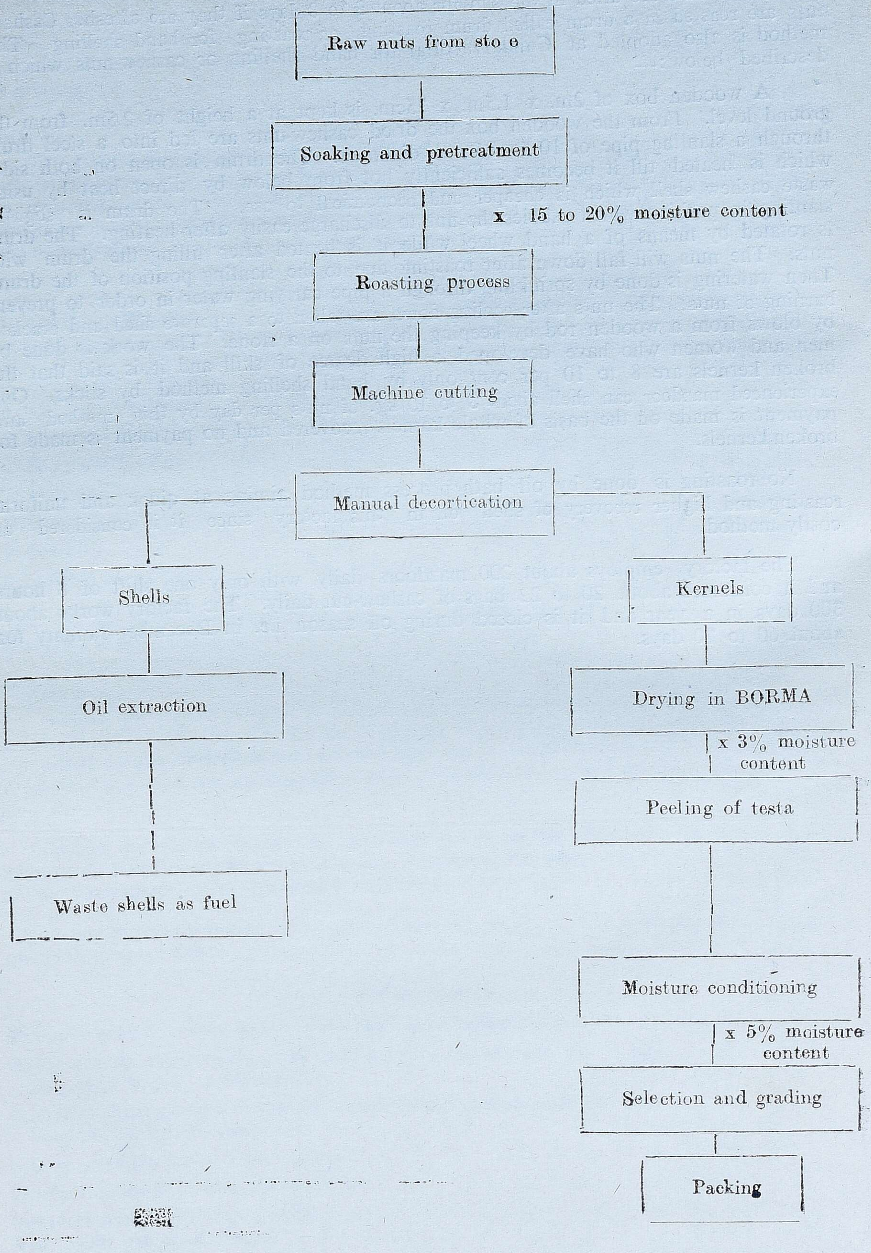
Cashew-nuts are dried in the sun for about 2 to 3 days if they are afresh. Cashew-nuts are roasted in a drum called drum roasting or roasting for hand shelling. This method is also adopted at Gandarvacottai for hand shelling or cashew-nuts which is described below:—

A wooden box of 2m. x 1.5m. x 75cm. is kept at a height of 2.5m. from the ground level. From the wooden box the dried cashew-unts are fed into a steel drum through a slanting pipe of 10 to 15 cm. diameter. The drum is open on both sides which is heated till it becomes sufficiently hot from below by direct heat by using waste cashew shell which is cheaper and economical to use. The drum is slightly slanting in position which enables the nut to discharge easily after heating. The drum is rotated by means of a hand wheel while it is heated after filling the drum with nuts. The nuts will fall down after roasting due to the slanting position of the drum. Then watering is done by sprinkling through a pipe carrying water in order to prevent burning of nuts. The nuts after cooling down are taken to a separate shed and cracked by blows from a wooden rod by keeping the nuts on a stone. The work is done by men and women who have developed a high degree of skill and it is said that the broken kernels are 8 to 10 per cent only by hand shelling method by sticks. One experienced mazdoor can shell about 8 to 10 kg. of nuts per day by this method and payment is made on the basis of whole kernels recovered and no payment is made for broken kernels.

No roasting is done by oil bath process method aiming at qiuck and uniform roasting and higher recovery of shell oil in this factory since it is considered as costly method.

The factory employs about 200 mazdoors daily with only one shift of 8 hours and it consumes about 20 to 22 bags of cashew-nut daily. The factory works about 300 days in a year and it is closed during off season i.e. in December-January for about 60 to 70 days.

PROCESS FLOW SHEET—CONVENTIONAL METHOD.


Raw nuts from store
Soaking and pretreatment
x 15 to 20% moisture content
Roasting process
Machine cutting
Manual decortication
Shells
Kernels
Oil extraction
Drying in BORMA
x 3% moisture content
Peeling of testa
Waste shells as fuel
Moisture conditioning
x 5% moisture content
Selection and grading
Packing

Extraction of cashew shell oil:

Outer shells of cashew-nuts are used for the extraction of cashew shell oil after the separation of edible cashew kernels from the shells. Shell oil is extracted from the machine roasted shell and unburnt shell.

Earthern pots with both sides open are used for extraction of shell oil. A perforated tin is placed at the bottom opening of the earthern pot. The pots are filled with shell to the full capacity and the opening at the top is closed lightly with clay. The capacity of each pot is about 3 to 4 kerosine tin full of shells. The pots are placed over the standing oven constructed for the purpose in a row. Whole of the oven at the top and sides is covered with fuel, mainly waste shell and paddy husk. Fire is set on the top in the evening and burning will be continued throughout the night, till about 8 to 9 a.m. of the next day. Kerosine tins are placed through an arc (arc is below the furnace) below the bottom position of the pot which is already closed with perforated tin. Cashew shell oil drips in it and the same is collected. Every morning the pots with shell are taken out and the process is repeated in the evening with fresh pots. The spent shells are used for further burning because it is cheap, economical and easily available. Two to three male mazdoors will be sufficient to extract four drums of shell oil.

Twelve bags of shell will give about 8 bags of oil extracted shell. The shells of about 5 to 6 bags are sufficient to burn and extract oil from 12 bags of shells. A bag of shell will give about 15 litres of cashew shell oil.

0.5 tonne of shell yield about 180 Kg. or one barrel of shell oil for which the extraction cost is only about Rs. 10. A barrel of cashew shell oil of 180 Kg. fetches Rs. 100 (ex-godown price).

The commercial shell oil obtained from the cashew nuts is a dark brown viscous oil easily soluble in most of the organic solvents. Although not a glyceride it is a drying oil. With suitable driers it gives a smooth shining film of dark brown colour. In India the oil is employed as a waterproofing agent and as a preservative in the painting of boats, fishing nets and light wood work. It is only in recent years the shell oil has attained technical importance. The Industrial applications of the shell oil are based upon its polymerization to a rubber like material under the influence of acids and on the formation of a wide range of condensation products with aldehydes. The latter are generally hard and extremely resistant to the action of chemicals such as acids and alkalis.

The shell oil is also distilled and polymerization products of the distillate or mixtures of distillate with other materials have found their way into the composition of diverse products such as insulating materials, varnishes, typewriter rolls, oil and acid proof cold seating cements, industrial flooring tiles and automobiles break linings. Shell oil is also used in the preparation of cement, adhesive ingredients, pigements for gums, inks, oil cloth, paints, varnishes, water proofing paper and cardboard finishing re-agents. Good baking enamels are prepared by dissolving the resin obtained by condensing the shell oil with formation in linsed or tung oil. The resin yields good varnishes with estergum and drying oils.

APPENDIX IX.

STATEMENT SHOWING THE AREA OF MANGROVE COUPES FELLED AND REVENUE REALISED FROM 1955–56 TO 1970–71 IN THANJAVUR FOREST DIVISION.

Year.	Name of the series.							
	Talainayar.				*Coleroon.*			
	Coupe number.	*Area in hectares.*	*Yield in ton.*	*Amount.*	*Coup number.*	*Area in hectares.*	*Yield in ton.*	*Amount.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
				RS.				RS.
1955–56	I	26.4	....	1,250	....	....	....	....
1957–58	II	20·4	62·50	1,111	....	....	....	...
1957–58	III	25·6	....	902	I	28·8	....	1,070
1958–59	IV	21·8	....	1,025	III	16·7	....	3,150
1959–60	V	9·6	20·00	435	IV	11·6	355·0	4,350
1960–61	VI	23·2	32·00	475	V	9·4	70·0	400
1961–62	....	....	....	....	VI	12·0	76·0	861
1961–62	....	....	....	....	VII	24·88	158·0	851
1962–63	....	....	....	....	....	....	....	....
1963–64	....	....	....	....	....	....	....	....
1964–65	....	....	....	....	VIII	6·0	39·0	405
1966–67	....	....	....	....	XI	11·40	81·28	1,301
1966–67	....	....	....	....	XII	10·00	267·22	1,805
1969–70	....	....	....	....	....	....	....	....
1970–71	....	....	....	....	XIII	10·12	....	300
					XIV	10·14	....	150

Note—1 Ton=1·016 tonnes.

APPENDIX IX—*cont.*

STATEMENT SHOWING THE AREA OF MANGROVE COUPES FELLED AND REVENUE REALISED FROM 1955-56 TO 1970-71 IN THANJAVUR FOREST DIVISION—*cont.*

Year.	*Name of the series.*											
	Chatram.				*Muthupet.*				*Tamarcankottai.*			
	Coupe number.	*Area in hectare.*	*Yield in ton.*	*Amount.*	*Coupe number.*	*Area in hectare.*	*Yield in ton.*	*Amount.*	*Coupe number.*	*Area in hectare.*	*Yield in ton.*	*Amount.*
(1)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
				RS.				RS.				RS.
1955–56	..	..	..	..	..	..	..	..	..	..	..	..
1957—58	..	..	..	..	..	..	..	..	..	..	..	..
1957–58	I	234·00	3,333·33	..	I	95·2	..	7,200	..	..	..	..
1958–59	II	94·4	10,750·00	..	II	125·2	..	13,650	..	..	..	..
1959–60	III	83·6	18,000·00	..	III	158·8	Not sold.	..	..	..	..	..
1960–61	..	..	..	..	..	..	..	..	I	53·82	365	7,151
1961–62	..	..	..	..	..	..	..	..	..	..	..	..
1961–62	..	..	..	..	..	..	..	..	..	..	..	..
1962–63	..	..	..	..	..	..	..	..	II	40·47	327·50	9,000
1963–64	..	..	..	..	..	..	..	..	III	40·47	260·50	9,050
1964–65	..	..	..	..	..	..	..	..	..	..	..	..
1965–66	..	..	..	..	..	..	..	..	..	..	..	..
1966–67	..	..	..	..	..	..	..	..	..	..	..	..
1969–70	..	..	..	..	..	..	..	..	VII	40·47	336·67	5,500
									VIII	40·47	388·0	7,000
									IX	40·47	116·60	3,460
1970–71	..	..	..	..	..	..	..	..	IV	40·47	43·30	4,305
									V	40·47	43·38	4,305
									VI	40·47	43·47	4,310
									X	40·61	..	5,021

APPENDIX X.

STATEMENT SHOWING THE AREA OF CASUARINA COUPES FELLED AND REVENUE REALISED FROM 1956–57 TO 1969–70 IN THANJAVUR FOREST DIVISION.

Year.	Name of the series and range.											
	No. I range, Thanjavur			No. III range, Tiruchirappalli.			No. IV range, Sirkali.					
	Kombaiyarnathem.			Kovilady.			Sodiakudy.			Mudalaimadu.		
	Area in hectares.	Yield in tonnes.	Amount.	Area in hectares.	Yield in tonnes.	Amount.	Area in hectares.	Yield in tonnes.	Amount.	Area in hectares.	Yield in tonnes.	Amount.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
			RS.			RS.			RS.			RS.
1956–57	..	..	..	..	..	..	..	..	..	..	..	..
1957–58	..	..	..	..	..	..	10·31	205	12,000	..	..	..
1957–58	..	..	..	..	..	..	4·65	152	2,650	..	..	..
1958–59	..	..	..	..	..	..	12·24	465	21,220	..	..	..
1959–60	..	..	..	..	..	..	10·92	206	15,802	9·71	391	20,600
1960–61	..	..	..	..	..	..	4·84	190	15,500	4·04	229	14,321
1961–62	..	..	..	..	..	..	..	..	..	..	..	..
1962–63	..	..	..	..	..	..	..	..	..	..	..	..
1964–65	..	..	..	..	..	..	14·16	285¼	16,100	..	..	..
1965–66	..	..	..	..	..	..	18·49	150	8,350	..	..	..
1966–67	..	..	..	..	..	..	..	..	..	12·95	247½	19,425
1967–68	..	..	..	..	..	..	8·09	50½	9,080	16·33	400	26.710
1968–69	1·25	23	3,000	4·47	39	1970	..	..	..	..	..	..
1969–70	0·76	..	345	..	..	..	..	..	..	..	..	..

APPENDIX X—*cont.*

STATEMENT SHOWING THE AREA OF CASUARINA COUPES FELLED AND REVENUE REALISED FROM 1956–57 TO 1969–79 IN THANJAVUR FOREST DIVISION—*cont.*

Name of the series and range.

Year.	*No. IV range, Sirkali.*									*Pattukottai range.*		
	Alankkudy.			*Maharajapuram.*			*Pudupattinam.*			*Udayamarthandapuram.*		
	Area in hectares.	*Yield in ton.*	*Amount.*	*Area in hectares.*	*Yield in ton.*	*Amount.*	*Area in hectares.*	*Yield in ton.*	*Amount.*	*Area in hectares.*	*Yield in ton.*	*Amount.*
(1)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
			RS.			RS.			RS.			RS.
1956–57	..	..	..	..	..	..	..	..	..	10·31	104	2,500
1957–58	..	..	..	..	..	..	..	..	..	..	..	..
1957–58	..	..	..	..	..	..	..	..	..	..	..	..
1958–59	..	..	..	..	..	..	..	..	..	..	..	..
1959–60	2·42	60	4,000	..	..	..	..	..	..	..	..	..
1960–61	..	..	..	..	..	..	..	..	..	..	..	..
1961–62	13·48	113	4,015	Bit I. II	13·20 4·16	283 101	33,030 11,000	..	..	..	..	..
1962–63	7·68	381	14,200	..	..	..	..	..	..	10·11	..	6,075
1964–65	..	..	..	..	..	..	..	..	..	4·05	12½	6,000
1965–66	..	..	..	..	..	..	..	..	..	..	..	..
1966–67	..	..	..	..	..	..	..	..	..	..	..	..
1967–68	6·07	59	6,505	21·44	250	17,550	4·45	51	3,555	15·58	144	11,525
1968–69	..	..	..	18·55	121	12,800	9·20	180	13,785	..	..	..
1969–70	8·90	..	26,125	..	..	..	8·36	..	11,015	..	..	..

Note—1 Ton = 1·016 tonnes.

APPENDIX XI.

STATEMENT SHOWING THE YIELD AND REVENUE REALISED FROM DIFFERENT ITEMS OF MINOR FOREST PRODUCE FROM 1956–57 TO 1968–69.

Serial number and name of produce.	1956–57.		1957–58.		1958–59.		1959–60.		1960–61.		1961–62.		1962–63.	
	Yield.	*Revenue.*	*Yield.*	*Revenue.*	*Yield.*	*Revenue.*	*Yield.*	*Revenue.*	*Yield.*	*Revenue.*	*Yield.*	*Revenue.*	*Yield.*	*Revenue.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
		RS. P.		RS. P.		RS. P.		RS. P.		RS. P.		RS. P.		RS. P.
1 Elandai	..	..	7,405 Lit.	..	4,176 Lit.	..	3,066 Lit.	..	63 Lit.	..	625 Lit.	..	2,100 Lit.	..
2 Palmyrah leaves	..	..	Nil.	..	Nil.	..	Nil.	..	Nil.	..	6,650 Numbers.	..	20,735 Numbers.	..
3 Dry manure leaves	..	..	Nil.	..	50,000 Kg.	..	8,050 Kg.	..	11,250 Kg.	..	29,250 Kg.	..	39,734 Kg.	..
4 Coconuts	..	..	Nil.	..	Nil.	..	Nil.	..	Nil.	..	Nil.	..	Nil.	..
5 Coconut leaves	..	..	Nil.	..	Nil.	..	Nil.	..	Nil.	..	Nil.	..	Nil.	..
6 Eachan	..	..	Nil.	..	Nil.	..	Nil.	..	Nil.	..	Nil.	..	Nil.	..
	..	..	Nil.	..	Nil.	4,914·00	Nil.	1,332·00	Nil.	3,585·00	Nil.	1,859·00	Nil.	3,355·00
7 Pagal fruits	Nil.	Nil.	Nil.	372·00	Nil.	..	Nil.	..	120 Kg.	..	6,250 Kg.	..	10 Kg.	..
8 Avaram bark	..	..	60 Kg.	..	Nil.	..	Nil.	..	1,275 Kg.	..	1,000 Kg.	..	3,629 Kg.	..
9 Shells	..	..	Nil.	..	Nil.	..	Nil.	..	2,400 Kg.	..	Nil.	..	4,703 Kg.	..
10 Cow dung	..	..	Nil.	..	Nil.	..	Nil.	..	Nil.	..	Nil.	..	4,572 Kg.	..
11 Brush wood	..	..	Nil.	..	Nil.	..	Nil.	..	301 Cub. M.	..	Nil.	..	Nil.	..
12 Palmyrah fruits	..	..	Nil.	..	Nil.	..	Nil.	..	Nil.	..	Nil.	..	Nil.	..
13 Aloe fibre	..	..	Nil.	..	Nil.	..	Nil.	..	Nil.	..	Nil.	..	51 Kg.	..

APPENDIX XI—*cont.*

STATEMENT SHOWING THE YIELD AND REVENUE REALISED FROM DIFFERENT ITEMS OF MINOR FOREST PRODUCE FROM 1956–57 TO 1968–69.

Serial number and name of produce.	1963–64.		1964–65.		1965–66.		1966–67.		1967–68.		1968–69.	
	Yield.	*Revenue.*	*Yield.*	*Revenue.*	*Yield.*	*Revenue.*	*Yield.*	*Revenue.*	*Yield.*	*Revenue.*	*Yield.*	*Revenue.*
		RS. P.		RS. P.		RS. P.		RS. P.		RS. P.		RS. P.
(1)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
1 Elandai	1,950 Lit.	..	554 Lit.	..	2,762 Lit.	..	1,069 Lit.	..	880 Lit.	..	1,200 Lit.	..
2 Palmyrah leaves	11,285 Nos.	..	Nil.	..	Nil.	..	Nil.	..	7,000 Nos.	..	Nil.	..
3 Dry manure leaves	39,264 Kg.	..	6,500 Kg.	..	Nil.	..	Nil.	..	Nil.	..	Nil.	..
4 Coconuts	Nil.	..	Nil.	..	Nil.	..	175 Nos.	..	155 Nos.	..	30 Nos.	..
5 Coconut leaves	Nil.	..	Nil.	..	Nil.	..	100 Nos.	..	40 Nos.	..	10 Nos.	..
6 Eachan	Nil.	..	1,000 Kg.	..	Nil.	..	Nil.	..	750 Kg.	..	Nil.	..
	Nil.	22,83·00	Nil.	979·00	Nil.	1,210·00	Nil.	1,477·00	Nil.	1,446·00	Nil.	962·00
7 Pagal fruits	Nil.	..	Nil.	..	Nil.	..	Nil.	..	Nil.	..	Nil.	..
8 Avaram bark	2,534 Kg.	..	3,670 Kg.	..	Nil.	..	Nil.	..	Nil.	..	Nil.	..
9 Shells	Nil.	..	Nil.	..	Nil.	..	Nil.	..	Nil.	..	Nil.	..
10 Cow dung	1,792 Kg.	..	4,800 Kg.	..	Nil.	..	Nil.	..	Nil.	..	Nil.	..
11 Brush wood	Nil.	..	Nil.	..	Nil.	..	Nil.	..	Nil.	..	Nil.	..
12 Palmyrah fruits	1,434 Kg.	..	1,700 Kg.	..	Nil.	..	Nil.	..	Nil.	..	Nil.	..
13 Aloe fibre	Nil.	..	Nil.	..	Nil.	..	Nil.	..	Nil.	..	Nil.	..

APPENDIX XII.

LIST OF FOREST OFFICERS WHO HELD CHARGE OF THE THANJAVUR FOREST DIVISION FROM 1956 TO-DATE.

Serial number and name of the Officers. (1)	*From.* (2)	*To.* (3)	*Remarks.* (4)
1 Thiru M. Thyagarajan. I.F.S.	1st September 1956.	24th May 1960	....
2 Thiru G. M. A. Quarishi, B.A.	25th May 1960	15th June 1960	Additional charge.
3 Thiru K. Thirumalairaj, I.F.S.	16th June 1960	20th June 1960	Do.
4 Thiru K. P. D. Rao, I.F.S.	21st June 1960	19th July 1963	....
5 Thiru Ebenezer Jacob	20th July 1963	15th November 1964.	....
6 Thiru P. Baskaradoss, I.F.S.	16th November 1964.	26th June 1965	....
7 Thiru K. M. Guruswamy Gounder, B.A.	27th June 1965	7th May 1966	....
8 Thiru S.Y. Devaraj	8th May 1966	7th June 1966	Additional charge.
9 Thiru K. M. Gurusamy Gounder, B.A.	8th June 1966	27th June 1966.	....
10 Thiru A. Saldhanraj I.F.S.	28th June 1966	17th December 1966.	....
11 Thiru S. Y. Devaraj	18th December 1966.	22nd January 1967.	Additional charge.
12 Thiru A. Saldhana, I.F.S.	23rd January 1967.	6th October 1968	....
13 Thiru V. M. Narasimhan, B.Sc.	7th October 1968.	To date.	

APPENDIX XIII.

LIST OF TEAK AVENUE PLANTATIONS IN THANJAVUR FOREST DIVISION.

Serial number. (1)	*Year of plantation.* (2)	*Name of the river.* (3)	*L.B. or R.B.* (3)	*Distance.* *From* (5)	*Distance.* *To* (6)	*Extent in hectares.* (7)	*Total extent in hectares.* (8)	*Percentage of stocking.* (9) PER CENT
No. 1.	*Range, Thanjavur.*							
1	1956	Vennar	LB	28/6	34/4	25·07	25·07	35
2	1957	Vennar	LB	35/0	45/0	..	69·29	20
			RB	28/0	45/0			
		Vettar	LB	37/2	45/0			
			RB	37/4	45/0			
3	1958	Vennar	LB	40/3	41/4	..	78·51	24
			LB	45/0	55/0			
			RB	45/0	55/0			
		Vettar	LB	45/0	49/6			
			RB	45/0	53/6			
		Vadavar	LB	0/50	5/56			
4	1959	Vennar	LB	55/0	58/1	..	44·92	40
		Vettar	LB	53/4	58/4			
			RB	59/4	63/7			
		Vadavar	LB	7/80	10/83			
5	1960	Vennar	LB	58/1	67/5		62·33	42
			RB	55/0	67/4			
		Vettar	LB	63/3	66/1			
			RB	65/0	66/1			
6	1961	Solasudamaniayar	LB	62/7	66/0	..	63·13	44
			RB	63/0	63/2			
		Sengalipuram canal	LB	7/0	7/5			
			RB	7/2	7/5			
		Vettar	LB	73/4	74/4			
			RB	72/6	75/2			
		Odambogiyar	LB	74/0	74/4			
		Common canal	RB	0/0	2/0			
			LB	0/3	1/2			
7	1962	Solasudamaniayar	LB	67/5	69/5	..	64·75	89
			RB	68/0	69/5			
		Pandavaiyar	LB	70/5	75/3			
			RB4	69/	72/0			
8	1963	Petharasanar	LB	71/2	72/3	..	64·75	67
		Solasudamaniyar	LB	69/6	74/3			
			RB	71/2	73/5			
		Pandavaiyvar	LB	68/1	70/5			
			RB	68/6	68/7			

APPENDIX XIII—*cont.*.

LIST OF TEAK AVENUE PLANTATIONS IN THANJAVUR FOREST DIVISION—*cont.*

Serial number.	*Year of plantation.*	*Name of the river.*	*L.B. or R.B.*	*Distance.*		*Extent in hectares.*	*Total extent in hectares.*	*Percentage of stocking.*
				From	*To*			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
No. 1, Range Thanjavur—cont.								PER CENT.
9	1964 ..	Velappar	LB	69/5	72/0	..	97·13	70
			RB	69/1	71/7			
		Vennar	RB	68/0	69/4			
		Vellayar	LB	69/3	74/6			
			RB	69/3	73/6			
10	1965 ..	Pandavaiyar	LB	76/6	78/7	..	64·75	78
			RB	76/1	76/4			
			RB	78/0	78/7			
		Velappar	LB	68/7	69/3			
			LB	72/0	73/6			
			RB	72/3	73/6			
11	1966 ..	Odambagiyar ..	LB	78/3	84/7	..	80·94	45
			RB	78/6	84/6			
		Velappar	LB	73/5	76/7			
			RB	73/5	76/5			
12	1967 ..	Velappar	LB	77/0	79/5	..	82·56	80
			RB	76/7	79/6			
		Sikkal	RB	0/0	1/2			
		Vettar	LB	80/3	82/3	..		
			RB	89/3	82/3			
		Palayavalam canal ..	RB	81/0	81/4			
		Odambogiyar ..	LB	85/2	90/2			
			RB	85/3	90/1			
		Palayanur canal ..		0/0	1/0			
13	1968 ..	Velappar	LB	82/0	86/4	..	100·37	90
			RB	82/6	86/4			
		Pandavaiyar ..	LB	68/7	84/4			
			RB	68/7	84/4			
		Southerajan	RB	0/0	1/1			
		Pitchakalayar ..	RB	0/0	0/3			
		Edayar	LB	0/0	0/2			
14	1969 ..	Vettar	LB	91/4	92/3	..	80·94	..
			RB	91/4	92/7			
		Velappar	LB	86/4	89/3			
			RB	86/4	89/3			
15	1970 ..	Vettar	LB	85/0	91/4	..	76·00	95
			RB	85/0	91/4			
		Kattar	LB	79/4	87/6			
		Koduvaiyar ..	RB	79/4	87/6			
						Grand Total ..	1,055·44	

APPENDIX XIII—*cont.*

LIST OF TEAK AVENUE PLANTATIONS IN THANJAVUR FOREST DIVISION—*cont.*

Serial number.	*Year of plantation.*	*Name of the river.*	*L.B. or R.B.*	*Distance.*		*Extent in hectares.*	*Total extent in hectares.*	*Percentage of stocking.*
				From	*To*			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
								PER CENT.
No. II Range, Kumbakonam :								
1	1957	Cauvery	LB	17/4	20/0	7·08	55·24	35
			LB	22/2	34/4	19/83	..	..
			RB	17/3	24/5	12/95	..	..
		Vennar	LB	17/3	23/3	12·95	..	..
		Kodamurutti ..	RB	30/1	33/5	2·43	..	..
2	1958	Cauvery	LB	39/7	48/1	13/15	71/23	35
			RB	37/2	48/3	22/45		..
		Kodamurutti ..	LB	37/2	43/2	11·85	..	..
			LB	46/0	48/1	6·48	..	..
			LB	54/0	57/1	3·64	..	..
			RB	40/0	47/2	12·05	..	..
		Arasalar	RB	46/2	47/2	1·61	..	..
3	1959 ..	Kodamurutti ..	LB	50/7	51/2	..	52·80	..
			LB	57/2	59/1	2·43	..	..
			RB	50/0	58/7	9·30	..	..
		Mudikondan ..	LB	54/7	60/0	9·51	..	..
			RB	54/0	60/0	7·49	..	..
		Cauvery	LB	48/5	52/7	8·09	..	..
			RB	53/4	56/6	8·49	..	..
		Arasalar	RB	53/5	55/0	3·85	..	..
		Tirumalairajan ..	LB	55/0	56/0	3·64	..	..
4	1960 ..	Kodamurutti ..	LB	59/0	63/1	8·90	61·51	45
			RB	59/1	62/5	6·88	..	..
		Tirumalairajan ..	LB	57/0	59/5	4·86	..	..
			RB	55/1	59/2	6·88	..	..
		Mudikondan	LB	60/1	62/2	3·26	..	..
			RB	60/0	62/3	3·26	..	..
		Cauvery	LB	54/2	56/4	6·48	..	..
			LB	57/7	59/7	4·70	..	..
			RB	58/4	60/2	4·86	..	..
		Arasalar	LB	57/3	60/0	4·70	..	..
			RB	56/3	59/1	6·73	..	..
5	1961 ..	Arasalar	LB	62/0	66/5	19·43	58·27	55
			RB	62/0	66/5	12·95	..	..
		Thirumalairajan ..	LB	59/4	66/0	17·80	..	..
			RB	59/4	62/5	8·09	..	..
					Total ..	..	299·05	
6	1962 ..	Mudikondan	RB	62/2	67/3	19·43	64·75	60
			LB	62/6	67/1	12·95	..	..
		Arasalar	RB	69/7	72/2	6·48	..	..
			LB	66/5	72/3	22·89	..	..

APPENDIX XIII—*cont.*

LIST OF TEAK AVENUE PLANTATIONS IN THANJAVUR FOREST DIVISION—*cont.*

Serial number.	*Year of plantation.*	*Name of the river.*	*L.B. or R.B.*	*Distance.*		*Extent in hectares.*	*Total extent in hectares.*	*Percentage of stocking.*
				From	*To*			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
								PER CENT.
No. II *Range, Kumbakonam*—cont.								
7	1963	Kodamurutti	RB	63/7	66/3	12·95	64·75	65
			LB	63/1	65/0	12·95	..	..
		Tiurmalairajan	RB	66/3	69/3	16·19	..	..
			LB	66/2	69/3	17·80	..	..
		Kodamurutti *alias* Puthur.	LB	65/5	65/5	4·86	..	..
8	1964	Arasalar	RB	76/1	77/0 }	17·80	97·12	65
				77/7	80/1 }			
			LB	76/1	80/0		30·76	..
		Puthur	RB	66/4	68/2 }	24·28	..	..
				68/5	70/3 }			
			LB	65/5	67/7	24·28	..	..
9	1965	Puthur	RB	70/2	73/5	22·25	77·70	70
			LB	69/6	70/6 }	6·88	..	..
				73/0	73/2 }			
		Noolar	LB	76/2	79/4	27·20	..	..
			RB	76/4	80/7	21·37	..	..
10	1966	Arasalar	LB	80/7	86/0	38·86	80·94	75
			RB	80/6	86/0	42·08	..	..
11	1967	Mudikondan	RB	68/0	80/4	40/47	80/94	85
			RB	67/7	80/4	40·47	..	..
12	1968	Tirumalairajan	RB	74/4	78/4	25·89	105·22	90
			LB	75/0	78/4	25·89	..	..
		Nattar	RB	67/7	77/1	26·72	..	..
			LB	67/7	77/1	26·72	..	..
13	1969	Nattar	LB	77/3	79/4	12·14	105·22	95
			RB	77/2	79/5	12·14	..	..
		Vanjiar	(Common)	75/5	79/0	24·28	..	..
		Mudikondan	,,	80/5	87/4	36·43	....	..
		Narumaniar	,,	3/3	5/2	20·23	..	..
14	1970	Vanjiar	,,	79/0	82/2	20·23	80·94	98
		Nular	,,	83/0	86/2	20·23	..	..
		Nattar	,,	80/0	86/4	40·48	..	..
					Grand total		1,056·63	
No. III Range, Tiruchirappalli :								
1	1956	Cauvery	RB	27/0	29/1	10·11	10·11	15
2	1957	Cauvery	RB	22/7	36/0	63.73	92.26	4
			LB	15/2	21/1	28·53	..	..
				C/O	Total		102·37	

APPENDIX XIII—*cont.*

LIST OF TEAK AVENUE PLANTATIONS IN THANJAVUR FOREST DIVISION—*cont.*

Serial number.	*Year of plantation.*	*Name of the river.*	*L.B. or R.B.*	*Distance.* *From*	*Distance.* *To*	*Extent in hectares.*	*Total extent in hectares.*	*Percentage of stocking.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
								PER CENT.
		Brought forward		..	..	..	102·37	
3	1958	Coleroon	RB	9/2	14/5	27·31	27·31	20
4	1959	Cauvery	LB	9/3	17/0	37·02	116·13	6
		Coleroon	LB	0/6	17/0	79·11	..	..
5	1960	New Kattalai H. L. channel	(Common).	19/6	39/6	92·27	92·27	100
6	1961	New Kattalai H. L. channel.	RB LB	24/5 24/5	39/5 38/0	97·12	97·12	65
7	1962	New Kattalai H. L. channel.	RB (Common) LB	24/5 17/6 17/3	24/6 19/6 24/1	66·37	66·37	100
8	1963	New Kattalai H. L. Channel.	(Common). RB (Common).	16/6 16/6 16/6	17/3 17/3 17/6	64·76	64·76	12·6
9	1964	New Kattalai H. L. channel.	RB LB	2/1 2/1	17/3 17/3	97·12	97·12	40
10	1965	Cauvery	RB	7/4	11/2	30·76	30·76	20·5
11	1966	Cauvery	LB	8/5	14/7	80·94	80·94	75
12	1967	Cauvery Upland drainage near Grand Anicut.	LB ..	24/0 ..	25/2 ..	48·56 22·66	71/22	90
13	1969	Coleroon	RB	21/0	29/2	48·56	48·56	95
14	1970	Uyyankondan channel	LB	3/0	9/6	50·00	90/00	100
		Coleroon	RB	29/2	33/0 50·00	40·00	..	..
				Grand total	..	.. ..	984·93	
No. IV Range, Sirkali :								
1	1956	Grand Anicut canal	RB LB	5/95 5/95	7/00 7/00	.. ..	10·72 ..	20 ..
2	1957	Grand Anicut canal	RB LB	7/00 7/00	14/35 14/35	.. ..	60·90 ..	27 ..
3	1957	Ananda Cauvery	RB LB	.. 0/00	.. 4/30	 ..	7·78 ..	20 ..
4	1958	Grand Anicut canal	RB LB	14/35 14/35	19/20 19/20	.. ..	44·50 ..	35 ..
5	1958	Kalyanaodai	RB LB	0/00 0/00	4/20 4/20	.. ..	38·95 ..	50 ..
6	1959	Grand Anicut canal	RB RB LB LB	19/25 23/60 19/25 23/60	22/85 28/10 2/85 28/10	.. ..	.. 64·75 .. 64·75 ..	.. .. 55 ..
						C/o ..	227·60	

APPENDIX XIII—*cont.*

LIST OF TEAK AVENUE PLANTATIONS IN THANJAVUR FOREST DIVISION—*cont.*

Serial number. (1)	*Year of plantation.* (2)	*Name of the river.* (3)	*L.B. or R.B.* (4)	*Distance.* *From* (5)	*Distance.* *To* (6)	*Extent in hectares.* (7)	*Total extent in hectares.* (8)	*Percentage o stocking.* (9)
								PER CENT.
				Brought forward		..	227·60	
7	1960	Grand Anicut canal	LB	28/10	35/85	..	..	..
			RB	28/10	35/85	..	..	
			RB	0/00	1/20	..	..	..
		Rajamadam canal	RB	0/00	3/00	..	64·75	60
			LB	0/00	3/00	..	..	..
8	1961	Cauvery	RB	60/1	66/2	..	..	55
			LB	60/2	64/2	..	..	..
		Veerasolan	RB	61/3	68/0	..	63·93	60
			LB	60/6	67/6	..	..	..
9	1962	Manniyar	RB	60/0	64/2	..	64·75	75
			LB	60/0	64/2	..	..	..
10	1963	South Rajan canal	RB	68/0	71/6	..	..	..
			LB	68/0	71/6	..	..	75
		Manniyar	RB	64/3	66/4	..	58·26	80
			LB	64/3	66/4	..	..	..
11	1964	Manniyar	RB	66/4	72/0	..	..	80
			LB	66/4	72/0	..	..	..
		Coleroon Right bank	RB	71/1	75/0	..	97·10	75
			LB	..	..	..	..	..
		Kumki-Manniyar	RB	0/0	8/0	..	..	85
			LB	0/0	8/0	..	..	..
12	1965	Manniyar	RB	72/0	76/4	..	64·75	70
			LB	72/0	76/4	..	..	..
		Ayyavaiyanar	RB	2/4	7/0	..	..	85
			LB	2/4	7/0	..	..	..
13	1966	Manniyar	RB	76/4	79/2	..	80·93	75
			LB	76/4	79/2	..	..	..
		Ayyavaiyanar	RB	7/0	11/0	..	..	70
			LB	7/0	11/0	..	..	..
		Cauvery	RB	89/0	90/7	..	..	70
			LB	89/0	90/7	..	..	..
14	1967	Cauvery	RB	90/7	93/4	..	90/64	65
			LB	90/7	93/4	..	..	..
		South Rajan canal	RB	71/6	76/2	..	..	75
			LB	71/6	76/2	..	..	..
		Odayar	RB	0/0	4/7	..	..	60
			LB	0/0	4/7	..	..	..
15	1968	Manjalar	RB	69/0	73/0	..	101·16	85
			LB	69/0	73/0	..	..	..
		Mahimalaiyar	RB	69/0	81/0	..	..	85
			LB	69/;0	81/0	..	..	..
							913·87	

APPENDIX XIII—*cont.*

LIST OF TEAK AVENUE PLANTATIONS IN THANJAVUR FOREST DIVISION—*cont.*

Serial number.	*Year of plantation.*	*Name of the river.*	*L.B. on R.B.*	*Distance.*		*Extent in hectares.*	*Total extent in hectares.*	*Percentage of stocking.*
				From	*To*			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
								PERCENT.
16	1969	Manjalar	RB	74/0	80/7		101·17	80
			LB	74/0	80/7	..	..	..
		Mahimalaiyar	RB	81/0	86/7	..	..	80
			LB	81/0	86/7	..	..	..
17	1970	Cauvery	RB	73/0	76/0	..	59·88	80
			LB	73/0	76/0	..	..	..
		Vikramanar	RB	8/0	9/0	..	..	80
			LB	8/0	9/0	..	..	..
		Ayyavaiyanar	RB	0/0	2/4	..	..	85
			LB	0/0	2/4	..	..	..
				Grand total	..	..	1074·92	
No. V Range, Mannargudi :								
1	1959	Old Vadavar	RB	0/0	0/70	8/90	64·75	47
		Vadavar Ext. canal.	RB	10/83	13/40	23·47	..	..
		Mannargudi main canal	RB	0/00	4/55	28·33	..	..
		No. 7 canal	RB	0/00	0/70	4·05	..	..
2	1960	Vadavar Ext. canal	RB	13/40	14/71	19·42	64·75	30
		Vadavar Ext. canal	RB	0/05	5/95	45·33	..	..
3	1961	Pamaniyar	LB	60/0	63/0	..	..	..
			RB	60/0	69/0	30·76	64·75	80
		Korayar	RB	63/0	69/4	33·99	..	..
4	1962	Pamaniyar	RB	71/0	74/4	64·75	64·75	94
			LB	73/0	74/4	..	..	..
5	1963	Korayar	RB	82/0	83/5	59·90	..	..
6	1964	Pamaniyar	RB	74/4	79/3	77·70	97·13	86
			LB	74/4	76/1	..	..	..
		Korayar	LB	79/1	82/0	19·43	..	..
7	1965	Adapar	RB	80/7	82/1	10·70	64·75	75
		Nulliyar	RB	81/2	86/2	54·0	..	..
8	1966	Ayyanar	RB	76/6	79/6	80·94	80·94	86
9	1967	Mulliyar	RB	78/2	81/1	64·75	..	..
			RB	86/2	89/7	..	80·94	90
		Ayyanar	RB	76/0	76/6	16·19	..	..
10	1968	Mulliyar	RB	91/3	96/0	51·80	100·37	97
		Harichandra	RB	75/2	79/0	48·57	..	..
11	1969	Korayar	RB	72/4	76/1	57·75	..	..
		Harichandra	RB	87/6	92/6	54·70	140·03	100
		Ayyanar	RB	79/5	81/4	27·58	..	..
12	1970	Harichandra	79/0	86/0	64/00	..	102·00	100
		Puluvanar	RB	0/00	3/11	38·00	..	..
				Grand total		..	989·91	

ABSTRACT.

		H. A.
1	Plantation Range No. I, Thanjavur	1055·44
2	Plantation Range No. II, Kumbakonam	1056·63
3	Plantation Range No. III, Tiruchy	984·93
4	Plantation Range No. IV, Sirkali	107492
5	Plantation Range No. V, Mannargudi	989·91
	Grand total	5161·83

APPENDIX XIV.

LIST OF OCMPACT TEAK PLANTATIONS RAISED UPTO 1970 IN THE THANJAVUR FOREST DIVISION.

Serial number. (1)	Serial number as per the statement in the map. (2)	Year of plantation. (3)	Name of the locality. (4)	Species. (5)	Area in hectares. (6)	Percentage. (7)	Remarks. (8)
No. 1 Kange, Thanjavur.							
			Vennar and Vettar Teak compact.				
						PER CENT.	
1	1	1956	Thenperambur (R. S. 174, 180H).	Teak	8·49	70%	
2	2	1957	Vinnamangalam (R. S. 167)	Teak, Sissoo Terminalia tomentosa.	4·37	5%	
3	3	1957	Kalumangalam (R. S. 348/1).	Teak	0·99	..	Failure.
4	3a	1957	Perambur II Sethi (R. S. 1/1, 2/2).	Teak	1·90	..	..
5	4	1957	Kallaperambur (RL. No. 1, R. S. No. 1/1, 2/2).	Teak, Acacia, arabica, Bamboo, Euc. hybrid.	0·55	50%	Replanted with E. H. and Bamboo during 1962.
6	4a	1957	Kallaperambur (R. L. No. 2, R. S. 2/2).	Teak..	1·62	30%	..
7	5	1958	Thenperambur (RL. 3, R. S. 280).	Teak, Sissoo Acacia.	0·67	50%	..
8	6	1957	Keelathiruppanthiruthi (R. S. 311/C).	Teak	0·12	..	Failure
9	7	1957	Rajendram (R. S. 252/B).	Teak, Sissoo Babul, Euc. hybrid, Bamboo.	0·59	45%	..
10	8	1957	Rajendram I (R. S. 468).	Teak, Sissoo	0·83	33%	..
11	9	1957	Rajendram II (R. S. 468 and 461).	Teak	0·30	..	Failure
12	10	1957	Nag ethi (RL 1, RS 238/C)	Teak Ailanthus, Eugina jambulana.	0·05	35%	..
13	11	1957	Nagethi (RL 2, RS 238/A1 RS 248/A1)	Teak Terminalia tomentosa.	1·07	35%	..
14	12	1957	Nagethi (RL 3, RS 238/A1)	Teak	0·57	20%	..
15	12a	1957	Nagethi (RS 238/B1)	Teak , Terminalia, Arjuna, Eugina, Jambulana.	1·42	20%	..
16	13	1957	Nagethi (RL 4, RS 238/B)	Teak, Sissoo, Euc. hybrid Bamboo	0·57	20%	Replanted with bamboo during 1964.

APPENDIX XIII—*cont.*

LIST OF TEAK AVENUE PLANTATIONS IN THANJAVUR FOREST DIVISION—*cont.*

Serial number. (1)	*Serial number as per the statement in the map.* (2)	*Year of plantation.* (3)	*Name of the locality.* (4)	*Species.* (5)	*Area in hectares.* (6)	*Percentage.* (7)	*Remarks.* (8)
17	14	1957	Nagethi (RL 5, RS 238/B)	Teak	0·81	25%	..
18	15	1957	Nagethi (RL 6, RS 238/C)	Teak, Bamboo	0·87	25%	Replanted with bamboo during 1964.
19	16	1957	Nagethi (RL 7, RS 248/A and 248/B).	Teak	0.53	25%	..
20	17	1957	Nagethi (RL 8, RS 238/A)	Teak	0·12	20%	..
21	18	1957	Nagethi (RL 9, RS 360/A1)	Teak, Sissoo, Euc. hybrid Bamboo	0·11	40%	Replanted with Bamboo and Euc. hybrid during 1963 and 1964.
22	18a	1957	Do.		LB 2·85 RB		
23	19	1957	Thenperambur (RS 173)	Compact	0·46	40%	..
24	20	1957	Nagethi, Rajendram (RS 410/A).	Teak Bamboo	0.81	10%	..
25	21	1957	Thenperambur (RL II, RS 180/H).	Teak Bamboo ..	0.53	40%	..
26	22	1957	Rayandur (RS 1/1) ..	Teak	0·51	..	Failure
27	23	1957	Thottakadu (RS 282/a to II RS 284/2).	.. .. ..	0·63	..	Highly wooded and sealed failure plot.
28	24	1957	Velur (RS 10)	Teak	0·64	..	Failure
29	25	1957	Neithalur RS II, 7A, 7B	Teak	0.45	40%	..
30	26	1958	Melathur (RS 228 5 SETHI)	Teak, Sissoo ..	2·43	10%	..
31	26a	1958	Melathur RS 228	Teak	0·19	..	Failure
32	27	1958	Melathur RS 169 ..	Teak	0·16	..	Failure
33	28	1958	Melathur RS 232/2 ..	Teak, Sissoo ..	0·19	30%	..
34	29	1958	Viludhiyur RL, I, RS 424, 425/6, 426.	Teak, Sissoo ..	1·34	..	Failure
35	30	1958	Viludhiyur RL II, RS. 440	Teak, Sissoo, Babul	2·02	50%	..
36	31	1958	Viludhiyur RL III, Bit I, RS 476.	Teak, Sissoo ..	0·60	10%	..
37	32	1958	Viludhiyur, RL III, Bit II RS 465.	Teak	0·26	..	Failure
38	33	1958	Viludhiyur, RL IV, RS 473/2	Acacia, Kodukapulli	0·33	50%	..
39	34	1958	Kothangudi RS 137 ..	Teak	0·11	12%	..
40	35	1958	Neikunnam RS 14/2 ..	Teak	0·17	..	Failure
41	36	1958	Rajendram RL II, RS 252/B	Teak, Sissoo ..	0·58	45%	..

APPENDIX XIII—cont.

LIST OF TEAK AVENUE PLNTATIONS IN THANJAVUR FOREST DIVISION—contd.

Serial number. (1)	Serial number as per the statement in the map. (2)	Year of plnatation. (3)	Name of the locality. (4)	Species. (5)	Area in hectares. (6)	Percentage. (7)	Remarks. (8)
42	37	1958	Melakalakudi RS 160 ..	Teak	0·20	10%	..
43	38	1958	Rayandur, RS 51/1, 31/2, 7	Teak, Sissoo ..	0·76	..	Failure
44	39	1958	Allur Bits I and II, RS 351/C	Teak, Sissoo ..	0.75	..	Failure
45	40	1960	Needamangalam, RS 197/1	Teak, Sissoo Bamboo	0·22	85%	..
				Vadavar compact.			
46	1	1959	Poondi RS 333/C ..	Teak, Sissoo, Bamboo, T. Arjuna, Euc. hybrid.	0·73	50%	..
47	2	1959	Saliamangalam RL I, RS 385/1-3.	Do.	1·98	60%	..
48	3	1959	Saliamangalam, RL II, RS 386/C.	Do.	0.64	60%	..
49	4	1959	Saliamangalam, RL III, RS 389/1.	Do.	1.07	60%	..
50	5	1959	Thirubuvanam, RL I, RS 8/A.	Do.	0·61	30%	..
51	6	1959	Thirubuvanam RL II, RS 1/1.	Do.	0·20	30%	..
52	7	1959	Kambiarnatham, RS 4B, 1B, 3B, 3 A.	Do.	8·52	70%	Replanted with Sissoo E. Hybrid during 1962, 1963 and 1970.
				Total	57·49		
***No. II**, Range, Kumbakonam :*							
				Thiruvaiyar Beat.			
1	1	1957	Vithelepuram (RS 262/7)	Teak	1·52	55%	..
2	2	1957	Neducauveri I (RS 300/1) ..	Teak	0·61	55%	..
3	3	1957	Naducauveri II (RS 266/B)	Teak, Bamboo ..	1·21	65%	..
4	4	1958	Maharajapuram (RS 21/2)	Teak	0·40	50%	..
5	5	1958	Veduvokudi (RS 12) ..	Teak	0·61	65%	..
6	6	1958	Achanur (RS 12)	Teak	0·91	34%	..

APPENDIX XIII—*cont.*

LIST OF TEAK AVENUE PLANTATIONS IN THANJAVUR FOREST DIVISION—*cont.*

Serial number. (1)	*Serial number as per the statement in the map.* (2)	*Year of plantation.* (3)	*Name of the locality.* (4)	*Species.* (5)	*Area in hectares.* (6)	*Percentage.* (7)	*Remarks.* (8)
			Thiruvaiyar Beat—*cont.*				
7	7	1959	Vaithinathanpettai (RS 208)	Teak, Babul ..	1·01	37%	..
8	8	1959	Perumpuliyur (RS 528/A, 533/2).	Teak	0·77	75%	..
9	9	1959	Kalyanapuram (RS 32/A BC)	Teak	1·41	50%	..
			Swamimalai Beat.				
10	1	1959	Umbalaipadi RS 282 ..	Teak, Bamboo, Sesbania.	0·65	10%	Replanted with Sesbania during 1961–62 Bamboo during 1962-63.
11	2	1959	Sarukkai (RS 216/A)	Teak- Bamboo	0·77	70%	Replanted with Bamboo during 1962.
12	3	1959	Alavendipuram RS 221, 235/1.	Teak, Sissoo, Bamboo	1·42	40%	Replanted with Bamboo during 1961-62.
13	4	1959	Alavendipuram RS 240/1, 186/2.	Teak, Bamboo ..	0·24	15%	..
14	5	1959	Tiruvolanchuzhi, RS 29/1	Teak, Euc. hybrid, Bamboo.	0·18	45%	..
15	6	1959	Tiruvalanchuzhi, RS 284	Teak, Sissoo, Sesbinia	0·93	80%	Replanted with Sesbania during 1961-62.
16	7	1959	Ranganathapuram, RS 24	Teak, Sissoo, Bamboo	0·40	43%	Replanted with Bamboo during 1961-62.
17	8	1959	Puttisivaram, RS 302,327	Teak	0·25	20%	..
18	9	1959	Nallur I, RS 37/2 ..	Teak, Babul ..	0·28	75%	..
19	10	1959	Annikudi, RS 12	Teak	0·50	85%	..
20	11	1959	Nallur II, RS 26/8, 10A ..	Teak, Sissoo ..	0·40	85%	..
21	12	1960	Sarukkai, RS 216/A ..	Teak, Bamboo ..	2·83	55%	Replanted with Sesbania during 1961-62 and Bamboo during 1962-63.
22	13	1960	Alavendipuram, RS 201 ..	Teak, Sissoo, Bamboo	0·40	35%	Replanted with Bamboo during 1961-62.

APPENDIX XIII—*contd.*

LIST OF TEAK AVENUE PLANTATIONS IN THANJAVUR FOREST DIVISION—*contd.*

Serial number. (1)	*Serial number as per the statement in the map.* (2)	*Year of plantation.* (3)	*Name of the locality.* (4)	*Species.* (5)	*Area in hectares.* (6)	*Percentage.* (7)	*Remarks.* (8)
			Nachiarkoil Beat.				
23	1	1959	Payavathankotalai RS 116	Teak	0·51	53%	..
24	2	1961	Villianvarambal II, RS 29	Teak, Sissoo ..	0·26	60%	..
25	3	1961	Villianvarambal III, RS 123	Teak, Sissoo ..	0·40	85%	..
26	4	1961	Sembianvarambal II, RS 249	Teak, Sissoo, Babul	1·70	60%	..
27	5	1961	Sembianvarambal I, RS 249				
28	6	1961	Krishnapuram, RS 290	Teak, Sissoo ..	0·88	74%	..
29	7	1961	Enamallur I, RS 323 ..	Teak, Bamboo ..	0·44	27%	Replanted with Bamboo during 1961-62.
30	8	1961	Enamallur II, RS 310 ..	Teak, Sissoo, Bamboo	0·61	65%	..
31	9	1961	Enamallur III, RS 319 ..	Teak, Sissoo, Bamboo	0·38	42%	..
32	10	1961	Thandalam, RS 250 ..	Teak, Sissoo ..	1·21	30%	..
33	11	1961	Nachiarkoil, RS 32 ..	Teak, Sissoo, Bamboo	0·40	90%	..
34	12	1961	Nachiarkoil, RS 32 ..	Teak, Sissoo, Bamboo	0·28	90%	..
			Valangiman North.				
35	1	1958	Jenampadugai, RSK 10 and 11.	Teak	0·40	27%	..
36	2	1958	Udayallur, RS 311/2 ..	Teak, Sissoo, Bamboo	0·81	75%	..
37	3	1959	Tenampadugai, RS 290/1	Teak	0·87	40%	..
38	4	1959	Pattisvaram, RS 192 and 193	Teak	0.16	10%	..
39	5	1959	Chandrasekharapuram, RS 60	Teak, Sissoo ..	0·20	33%	..
40	6	1959	Thillaiyambur	Teak, Babul ..	0·26	68%	..
41	7	1959	Thillaiyambur, RS 185/8, 193	Teak, Sissoo, Babul, Mathi, Bamboo.	1·06	90%	..
42	8	1959	Ranganathanpuram I, RS 36	Teak, Babul ..	0·25	85%	..
43	9	1959	Ranganathanpuram II, RS 20	Teak, Babul, Sissoo	0·63	85%	..
44	10	1959	Ranganathanpuram, RS 59/4, IV.	Teak	0·26	75%	..
45	11	1959	Ranganathanpuram, RS V	Teak, Sissoo ..	0·25	85%	..
46	12	1959	Ranganathanpuram RS 35 II	Teak, Babul, Bamboo	0·47	50%	..
47	13	1959	Pattisuram, RS 188 ..	Teak	0·47	65%	..
48	14	1959	Thennampadugai ..	Teak	0·40	80%	..
49	15	1959	Thillaiyambur, RS 269 ..	Teak, Sissoo ..	0·26	78%	..

APPENDIX XIII—*cont.*

LIST OF TEAK AVENUE PLANTATIONS IN THANJAVUR FOREST DIVISION—*cont.*

Serial number.	*Serial number as per the statement in the map.*	*Year of plantation.*	*Name of the locality.*	*Species.*	*Area in hectares.*	*Percentage.*	*Remarks.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
50	16	1959	Thillaiyambur, RS 269 ..	Teak, Sissoo ..	0·55	35%	..
51	17	1959	RS 263	Teak, Sissoo, Babul	0·58	58%	..
			Valangaiman South.				
52	1	1958	Kavalur I, RS 211 A and B	Teak	0·35	50%	..
53	2	1958	Kavalur II, RS 193 ..	Teak, Sissoo ..	0·30	10%	..
54	3	1958	Kavalur III and IV, RS 210	Teak	0·12	..	Failure
55	4	1958	Agaramangudi, RS 407 ..	Teak, Sissoo ..	1·37	5%	..
56	5	1958	Ombathuvelli, RL I, RS 488/B	Teak	0·55	30%	..
57	6	1958	Ombarthuvelli, RL II, RS 566 and 488/A.	Teak	0·75	30%	..
58	7	1958	Ombathuvelli, R-L III, RS 455/3.	Teak	0·53	20%	..
59	8	1958	Thirukarukavur, RS 408/1	Teak	0·61	15%	..
60	9	1958	Maligaithidal, RS 464/B	Teak, Sissoo ..	0·05	..	Failure
61	10	1958	Uthukadu, RS 464/B ..	Teak, Acacia ..	0·97	3%	Failure
62	11	1959	Sithanvalur, RL I, RS 162/1	Teak, Sissoo, Acacia	0·49	55%	..
63	12	1959	Sithanvalur, RL II, RS 162/1	Teak	0·79	60%	..
64	13	1959	Sithanvalur, RL III, RS 162/1 RS 162/1.	Teak, Sissoo, T. Arjuua.	0.75	70%	..
65	14	1959	Sithanvalur, RL IV. RS 162/1, 163 and 26.	Teak, Sissoo ..	1.72	70%	..
66	15	1959	Mathur, RL I, RS 314/1, 200/2.	Teak, Sissoo, Euc. hybrid.	1·82	70%	Replanted with E. hybrid during 1963.
67	16	1960	Mathur, RL II	Euc. hybrid, Bamboo	0·51	70%	Replanted with Euc. hybrid and Bamboo during 1963.
68	17	1960	Kandiyur, Bit I, RS 423/B	Teak, Sissoo, Acacia Euc. hybrid Bamboo.	0·11	65%	Replanted with Bamboo during 1963.
69	18	1960	Kandiyur Bit II, RS 423/B	Teak, Sissoo, Acacia Euc.hybrid, Bamboo.	1·84	65%	Replanted with Bamboo during 1963.

APPENDIX XIII—*Cont.*

LIST OF TEAK AVENUE PLANTATIONS IN THANJAVUR FOREST DIVISION—*cont.*

Searil number. (1)	*Serial number as per the statement in the map.* (2)	*Year of plantation.* (3)	*Name of the locality.* (4)	*Species.* (5)	*Area in hectares.* (6)	*Percentage.* (7)	*Remarks.* (8)
70	19	1960	Kandiyur Bit III, RS 423/B	Teak, Sissoo, Acacia, Euc. hybrid, Bamboo.	0·17	60%	Replanted with Bamboo during 1963.
71	20	1960	Kandiyur Bit IV, RS 423/B, 415.	Teak, Sissoo, Acacia, Euc. hybrid, Bamboo.	1·78 0·18	67% 67%	Replanted with Bamboo during 1963.
72	21	1960	Thirukalambur, RS 94 ..	Sissoo	0·15	5%	Failure
73	22	1961	Pathur, RS 117, 12, Mangudi, RS 121 (Koradacheri).	Sissoo, Teak, E. H. Bamboo.	1·62	85%	Replanted with Bamboo during 1961.

No. III Range, Tiruchirappalli

Serial number. (1)	*Year of plantation.* (2)	*Name of locality.* (3)	*Species.* (4)	*Area in hectare.* (5)	*Percentage of stocking.* (6)	*Remarks.* (7)
1	1957	Vennarpadugai	Teak	2·22	19%	..
2	1957	Katchamangalam ..	Teak, Babul ..	1·21	1%	..
3	1957	Agarapettai	Teak, Babul ..	0.70	6·4%	..
4	1957	Rajagiri	Teak, Babul ..	0·50	20%	..
5	1957	Pudur	Teak, Babul ..	0·60	Nil.	..
6	1957	Thogur	Teak, Sissoo, Babul	6·68	36%	Replanted with Bamboo during 1963 and 1964.
7	1957	Pathirakudi	Teak	4·86	7%	..
8	1957	Mahadhevapuram ..	Teak	6·27	16%	..
9	1957	Koilady	Teak, Babul ..	1·62	46%	..
10	1958	Thirichinampoondi ..	Teak, Babul ..	1·01	14%	..
			Total	25·67		

ABSTRACT.

	HA.
1 Plantation Range No. I, Thanjavur	57·49
2 Plantation Range No. II, Kumbakonam	50·18
3 Plantation Range No. III, Tiruchirappalli	25·67
Grand total	133·34

APPENDIX—

TABLE SHOWING TOP HEIGHT AGAINST ALL INDIA SITE

Age in years	*Site.*	*Quality.*	I			II		
			2·0	1·0	0·0	2·0	1·0	0·0
			Top height in metres.					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
5	..	..	12·80	11·28	10·06	10·06	8·53	7·32
6	..	..	14·33	12·50	11·28	11·28	9·75	8·23
7	..	..	15·54	13·72	12·50	12·50	10·67	9·45
8	..	..	16·76	14·94	13·41	11·58	10·06	10·06
9	..	..	17·68	15·85	14·33	14·33	12·50	10·97
10	..	..	18·90	17·07	15·24	15·25	13·41	11·58
11	..	..	19·81	17·98	16·15	16·15	14·02	12·19
12	..	..	20·73	18·59	16·76	16·76	14·94	12·80
13	..	..	21·64	19·51	17·68	17·68	15·54	13·41
14	..	..	26·56	20·42	18·29	18·29	16·15	14·02
15	..	..	23·16	21·03	18·90	18·90	16·76	14·63
16	..	..	24·08	21·64	19·51	19·51	17.37	14·94
17	..	..	24·69	22·56	20·12	20·12	17·68	15·54
18	..	..	25·30	22·16	20·73	20·73	18·29	15·86
19	..	..	25·91	23·47	21·03	21·03	21·64	16·15
20	..	..	26·52	24·08	21·64	21·64	19·20	16·76
21	..	..	27·13	24·38	21·95	21·95	19·51	17·07
22	..	..	27·43	24·99	22·56	22·56	19·81	17·37
23	..	..	28·04	25·30	22·86	22·86	20·42	17·68
24	..	..	28·35	25·91	23·16	23·16	20·73	18·29
25	..	..	28·96	26·21	23·77	23·77	21·03	18·59
26	..	..	29·26	26·52	24·08	24·08	21·34	18·90
27	..	..	29·57	27·13	24·38	24·38	21·64	19·20
28	..	..	30·18	27·48	24·69	24·69	21·95	19·51
29	..	..	30·48	27·74	24·99	24·99	22·25	19·81
30	..	..	30·78	28·04	25·30	25·30	22·56	19·81
31	..	..	31·09	28·35	25·60	25·60	22·86	20·12
32	..	..	31·42	28·65	25·91	25·91	23·16	20·42
33	..	..	31·70	28·96	26·21	26·21	23·47	20·73
34	..	..	32·00	29·26	26·52	26·52	23·77	21·03
35	..	..	32·31	29·57	26·82	26·82	23·77	21·03
36	..	..	32·61	29·87	27·13	27·13	24·38	21·34
	..	..	32·92	30·18	27·43	27·43	24·38	21·64
38	..	..	33·22	30·48	27·74	27·74	24·69	21·95

XV.

QUALITY AND AGE FOR TEAK PLANTATION.

III			IV		
2·0	1·0	0·0	2·0	1·0	0·0
Top height in metres.					
(10)	(11)	(12)	(13)	(14)	(15)
7·32	6·10	4·88	4·88	3·96	3·02
8·23	7·01	5·79	5·79	4·67	3·53
9·45	7·92	6·40	6·40	4·88	3·66
10·06	9·53	7·01	7·01	5·49	3·96
10·97	9·14	7·62	7·62	5·79	4·25
11·58	9·75	8·23	8·23	6·40	4·57
12·19	10·67	8·53	8·53	6·71	4·88
12·80	10·97	9·14	9·14	7·01	5·18
13·41	11·58	9·45	9·45	7·32	5·49
14·02	11·89	9·75	9·75	7·92	5·79
14·63	12·50	10·36	10·36	8·23	5·79
14·94	12·80	10·67	10·67	8·53	6·10
15·34	13·11	10·97	10·97	8·84	6·40
15·85	13·72	11·28	11·28	9·14	6·71
16·15	14·02	11·58	11·58	9·14	7·01
16·76	14·33	11·88	11·88	9·45	7·01
17·07	14·63	12·19	12·19	9·75	7·32
17·37	14·94	12·50	12·50	10·06	7·62
17·68	15·24	12·80	12·80	10·36	7·62
18·29	15·54	13·11	13·11	10·67	7·92
18·59	15·85	13·41	13·41	10·67	8·23
18·90	16·15	13·72	13·72	10·97	8·23
19·20	16·46	13·72	13·72	10·97	8·23
19·51	16·76	14·02	14·02	11·28	8·84
19·81	17·07	14·33	14·33	11·58	8·34
20·12	17·07	14·33	14·33	11·58	8·84
20·12	17·37	14·63	14·63	11·89	9·14
20·42	17·68	14·94	14·94	12·19	9·45
20·73	17·98	15·24	15·24	12·19	9·45
21·03	18·29	15·24	15·24	12·50	9·75
21·03	18·29	15·54	15·54	12·80	9·75
21·34	18·59	15·85	15·85	12·80	10·06
21·64	18·90	15·85	15·85	13·11	10·36
21·95	19·20	16·15	16·15	13·11	10·36

APPENDIX—

TABLE SHOWING TOP HEIGHT AGAINST ALL INDIA SITE

Agei year	Size.	Quality.	I			II		
			2·0	1·0	0·0	2·0	1·0	0·0
			Top Height in metres.					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
39	..	..	33·50	30·78	28·04	28·04	24·99	21·95
40	..	..	33·81	31·09	28·04	28·04	25·30	22·26
41	..	..	33·81	31·42	28·35	28·35	25·60	22·56
42	..	..	34·44	31·70	28·65	28·65	25·60	22·86
43	..	..	34·75	31·70	28·96	28·96	25·91	22·86
44	..	..	35·05	32·00	29·26	29·26	26·21	23·16
45	..	..	35·36	32·31	29·26	29·26	26·21	23·45
46	..	..	35·66	32·61	29·57	29·57	26·52	23·77
47	..	..	35·97	32·92	29·87	29·87	26·82	23·77
48	..	..	35·97	33·22	30·18	30·18	27·13	24·08
49	..	..	36·27	33·22	30·18	30·18	27·13	24·08
50	..	..	36·58	33·50	30·48	27·43	24·38	24·38
51	..	..	36·88	33·81	30·78	30·78	27·74	24·69
52	..	..	37·19	33·81	31·09	31·09	27·74	24·69
53	..	..	37·19	34·14	31·09	31·09	28·04	24·99
54	..	..	37·49	34·44	31·42	31·42	28·04	24·99
55	..	..	37·80	34·75	31·70	31·70	28·35	25·30
56	..	..	37·80	34·75	31·70	31·70	28·35	25·30
57	..	..	38·10	35·05	32·00	32·00	28·65	25·60
58	..	..	38·40	35·05	32·00	32·00	28·96	25·60
59	..	..	38·40	35·56	32·31	32·31	28·96	25·91
60	..	..	38·71	35·66	32·31	32·31	28·96	25·91

XV—*cont.*

QUALITY AND AGE FOR TEAK PLANTATION—*cont.*

III			IV		
2·0	1·0	0·0	2·0	1·0	0·0
Top height in metres.					
(10)	(11)	(12)	(13)	(14)	(15)
22·26	19·20	16·15	16·15	13·41	10·67
22·26	19·51	16·46	16·46	13·72	10·67
22·56	19·81	16·76	16·76	13·72	10·97
22·86	19·81	16·76	16·76	14·02	10·97
22·86	20·12	17'07	17·07	14·02	11·28
23·16	20·42	17·37	17·37	14·83	11·58
23·45	20·42	17·37	17·37	14·33	11·58
23·77	20·73	17·68	17·68	14·63	11·58
23·77	20·73	17·68	17·68	14·63	11·89
24·08	21·03	17·98	17·98	14·94	11·89
24·08	21·03	18·29	18·29	14·94	12·19
24·38	21·34	18·29	18·29	15·24	12·19
24·69	21·64	18·29	18·29	15·24	12·19
24·69	21·64	18·59	18·59	15·54	12·50
24·99	21·95	18·59	18·59	15·54	12·50
24·99	21·95	18·90	18·90	15·85	12·80
25·30	22·25	18·90	18·90	15·85	12·80
25·30	22·25	19·20	19·20	16·15	12·80
25·60	22·56	19·20	19·20	16·15	13·11
25·60	22·56	19·51	19·51	16·46	13·11
25·91	22·86	19·51	19·51	16·46	13·41
25·91	22·86	19·81	19·81	16·46	13·41

APPENDIX XVI.

STATEMENT SHOWING THE PRUNING AND TENDING OPERATIONS CARRIED OUT IN DIFFERENT PLANTATIONS DURING 1968–69 AND 1969–70 IN THE THANJAVUR FOREST DIVISION.

Serial number and locality. (1)	*Year of plantation.* (2)	*Area in hecteres.* (3)	*Number of trees pruned and tended.* (4)
1968–69—			
A—AVENUE...			
No. I Range, Thanjavur—			
1 Vennar bank	1956	20·23	208
2 G.A. Canal	1956	20·23	211
3 Vennar bank	1957	30·35	1,883
4 Ananda Cauvery	1957	20·23	178
5 Pevani odai	1957	20·23	73
6 Vadavar	1957	4·04	10
7 Vettar	1957	20·23	759
8 Vennar bank	1958	30·35	863
9 Vadavar	1959	20·23	288
10 Vennar	1960	60·70	2,203
11 Vettar	1960	20·23	183
12 Odampakiar	1961	40·47	1,854
13 Sholachoodaminiyar	1961	40·47	1,326
14 Pandavaiyar river bank	1962	40·47	2,372
15 Sholachoodamaniyar drainage ch. ..	1962	40·47	2,311
16 Pandavaiyar river bunds	1963	20·23	1,123
No. II Range, Kumbakonam—			
1 Cauvery Avenue Teak plantation	1957	..	94
2 Do.	1957	..	269
3 Do.	1959	..	231

APPENDIX XVI—*cont.*

STATEMENT SHOWING THE PRUNING AND TENDING OPERATIONS CARRIED OUT IN DIFFERENT PLANTATIONS DURING 1968–69 AND 1969–70 IN THE THANJAVUR FOREST DIVISION.

Serial number and locality.	*Year of plantation.*	*Area in hecteres.*	*Number of trees pruned and tended.*
(1)	(2)	(3)	(4)
No. II Range, Kumbakonam—cont.			
4 Cauvery Avenue Teak plantation	1960	...	195
5 Do.	1961	..	105
6 Nattar Teak plantation	1961	..	— 1,198
7 Kodamurutty	1963	..	845
8 Nattar	1961	..	666
9 Arasalar	1962	..	340
10 Veerasolar	1962	..	935
11 Cauvery	1961	..	370
12 Cauvery	1960	..	284
13 Cauvery	1960	..	136
14 Arasalar	1961	...	208
15 Nattar	1961	..	629
16 Kodamurutty	1957	..	26
17 Kodamurutty	1957	..	66
18 Cauvery	1957	..	499
19 Kodamurutty	1963	..	200
20 Kodamurutty	1963	..	1,700
No. III Range, Tiruchirappalli—			
1 Teak Avenue Cauvery	1956	20·23	440
2 Pugalur Channel	1956	20·23	45
3 Cauvery	1957	24·28	447
4 Pugalur channel	1958	20·23	400
5 Coleroon	1958	24·28	380

APPENDIX XVI—*cont.*

STATEMENT SHOWING THE PRUNING AND TENDING OPERATIONS CARRIED OUT IN DIFFERENT PLANTATIONS DURING 1968-69 AND 1969-70 IN THE THANJAVUR FOREST DIVISION.

Serial number and locality. (1)	*Year of plantation.* (2)	*Area in hecteres.* (3)	*Number of trees pruned and tended.* (4)
No. III Range, Tiruchirappalli—cont			
6 Kalingarayan channel	1958	24·28	1,000
7 Coleroon	1959	20·23	460
8 Cauvery	1959	16·19	144
9 Vennar	1969	16·19	264
10 G.A. canal	1957	12·14	77
No. V Range, Mannargudy—			
1 Vadavar Extension channel	1959	64·75	3,976
2 Do.	1960	64·75	2,878
3 Paminiar and Kodaiyur	1961	64·75	6,447
4 Do.	1962	64·75	5,723
5 Koraiyar	1,963	64·75	4,362

B. COMPACT.

Serial number and locality. (1)	*Year of plantation.* (2)	*Area in hecteres.* (3)	*Number of trees pruned and tended.* (4)
No. I. Range, Thanjavur:			
1 Thanperambur	1956	8–50	1,422
2 Nagathy	1957	12–63	1,160
3 Vinnamangalam	1957	1–62	6
4 Thenperambur	1957	0–51	6
5 Kothangdui and Melakulakudi	1958	0–37	17
6 Saliamangalam	1959	3–70	788
7 Kembaiyarnatham	1959	7–99	
8 Thirubuvanam	1959	0–81	
9 Poondi	1969	0.72	
No. II Range, Kumbakonam :			
1 Perumpuliyur Cauvery L.B.	1959	0·77	400
2 Kalyanapuram (Kodamurtty R.B.)	1959	1·41	535
3 Vittatpuram (Cauvery L.B.)	1957	1.51	603
4 Mahadevapuram	1957	15.50	183

APPENDIX XVI--*cont.*

STATEMENT SHOWING THE PRUNING AND TENDING OPERATIONS CARRIED OUT IN DIFFERENT PLANTATION DURING 1968–69 AND 1969–70 IN THE THANJAVUR FOREST DIVISION.

Serial number and locality. (1)	*Year of plantation.* (2)	*Area in ha.* (3)	*Number of trees pruned and tended.* (4)
No. II Range, Kumbakonam—cont			
5 Mallur	1959	0·68	279
6 Mallur	1959	0·68	681
7 Annigudi	1959	0·49	220
8 Alavendipuram	1959	1·66	51
9 Alavendipuram	1959	1·66	204
10 Pazhavathankattalai	1950	0·50	116
11 Thiruvanchuli	1959	1·01	539
12 Umbalpadi	1959	0·64	202
13 Sarukkai	1959	0·76	286
14 Sarukkai	1960	2·83	382
15 Ranganathapuram	1959	2·30	100
16 Ranganathapuram	1959	0·40	176
17 Naducauvery block	1957	1·82	328
18 Naducauvery block	1957	1·82	29
19 Ranganathapuram	1959	2·30	92
20 Ranganathapuram	1959	2·30	132
21 Ranganathapuram	1959	2·30	358
22 Ranganathapuram	1959	2·30	176
No. III Range, Tiruchirappalli—			
1 Thogur Teak compact	1957	6·48	1,780
2 Mahadevapuram	1957	6·27	715
3 Agarapettai	1957	1·70	32
4 Rajagiri	1957	0·50	22
5 Tiruchinampoondi	1958	1·01	114
6 Kailadi Teak compact	1958	1·72	550
7 Grand Anicut	1957	1·62	282
8 Pattirikudi	1957	5·06	251
Thogur	1958	0·60	12

APPENDIX XVI—*cont.*

Statement showing the pruning and Tending OperatioIns carried out in differe plantations during 1968–69 and 1969–70 in the Thanjavur Forest Division.

Serial number and locality. (1)	*Year of plantation.* (2)	*Area in ha.* (3)	*Number of trees pruned and tended.* (4)
1969—70			
COMPACT.			
1 Thenperambur	1956	8·50	504
2 ”	1957	8·50	36
3 Vizhudiyur and Nattar	1958	2·85	906
4 Kavalur	1958	0·46	111
5 Agaramangudi	1958	1·37	62
6 Tiruchinampoondi	1958	1·01	28
7 Ompathuveli	1958	1·06	327
8 Oothukadu	1958	0·73	20
9 Maligaithidal	1958	0·30	4
10 Rajendram	1958	0·40	149
11 Sithanvalur	1959	3·67	680
12 Mathur	1959	3·33	229
13 Kandiyur	1959	1·84	74
14 Kandiyur	1960	2·20	170
15 Needamangalam	1960	0·27	96
AVENUE.			
1 G.A. canal	1957	40·47	2,061
2 G.A. canal	1958	40·47	1,993
3 Vadavar Teak avenue	1959	20·23	316
4 Vettar	1959	20·23	690
5 Sholasoodamaniyar Teak avenue	1962	40·47	838
6 Kappanamangalam	1962	20·23	528
7 Sholasoodamaniyar	1963	28·33	838
8 Common bank	1963	20·23	817
9 Sengalipuram	1963	20·23	132
10 Peetharasanur	1963	40·47	1,345
No. II Range, Kumbakonam—			
1 Cauvery	1957	20–23	754
2 Kodamurutty	1957	20–23	324
3 Cauvery	1958	20–23	175

APPENDIX XVI—*cont.*

Statement showing the pruning and Tending Operations carried out in different plantations during 1968-69 and 1969-70 in the Thanjavur Forest Division.

Serial number and locality. (1)	*Year of plantation.* (2)	*Area in ha.* (3)	*Number of trees pruned and tended.* (4)
No. II Range, Kumbakonam—cont.			
4 Arasalar	1958	30·35	337
5 Kodamurutty	1958	20·23	814
6 Cauvery	1959	20·23	310
7 Kodamurutty	1959	20·23	624
8 Arasalar	1959	20·23	317
9 Mudikondan	1959	30·35	823
10 Arasalar	1960	20·23	327
11 Kodamurutty	1960	20·23	277
12 Mudikondan	1960	40·47	1,017
13 T. Rajan	1960	28·33	784
14 T. Rajan	1961	20·23	374
15 Arasalar	1961	20·23	476
16 Cauvery	1960	10·11	131
17 Do	1961	10·11	147
18 Nattar	1961	20·23	324
19 Veerasolar	1961	20·23	317
20 Arasalar	1962	20·23	216
21 Mudikondan	1962	20·23	324
22 T. Rajan	1963	10·11	114
23 Kodamurutty	1963	20·23	214
No. III Range, Tiruchirappallit—			
1 Cauvery R.B.	1956	40·47	1,001
2 Vennar	1957	40·47	917
3 Cauvery L.B.	1957	20·23	106
4 Cauvery L.B.	1957	20·23	174
5 G.A. canal	1958	20·23	110
6 Coleroon R.B.	1958	20·23	514
7 Kalingarayan channel	1958	40·47	1,114

APPENDIX XVI—*cont.*

Statement showing the pruning and Tending Operations carried out in different plantations during 1968-69 and 1969-70 in the Thanjavur Forest Division.

Serial number and locality. (1)	*Year of plantation.* (2)	*Area in ha.* (3)	*Number of trees pruned and tended.* (4)
III. *Range, Tiruchirappalli*—cont.			
8 Coleroon L.B.	1958	20·23	714
9 Cauvery L.B.	1959	20·23	374
10 Kattalai high level channel ..	1960	2023	374
11 Do.	1961	20·23	515
12 Do.	1962	20·23	427
13 Do.	1963	20·23	714
No. IV. Range, Sirkali:—			
1 Manniar	1962	20·23	218
2 Do.	1963	20·23	324
No. V. Range, Mannargudy:			
1 Vadavar extension channel	1959	50·00	1,115
2 Paminiar and Koraiyar	1961	100·00	2,850
3 Koraiyar	1963	100·00	2,900

APPENDIX XVII-A.

STANDARD ESTIMATE WITH TIME SCHEDULE FOR WORK.

The cost of formation of Teak plantation is furnished below till the end of second year.

(Spacing 3·5 m × 3·5m or 3·5 m apart 200 plants per hectare).

A. Nursery:

Nursery—One standard bed of 10m × 1m × 30 cm).

Serial number and Particulars of work. (1)	*Quantity.* (2)	*Rate.* (3)	*Amount.* (4)	*Time schedule.* (5)	*Remarks.* (6)
1 Digging a new area to a depth of 30cm. and breaking clads.	3·3· m 3	0·70 per m3	2·30	January.	..
2 Collection and transport of pegs of miscellaneous species 60 cm. in length for fixing side supports of bamboo	50 Pegs per bed.	2·00 per 100	1·00	February.	..
3 Fixing split bamboo supports in position with pegs.	1 bed	1 male mazdoor for 4 pegs.	0·50	March.	..
4 Collection of sand, transport of same and mixing up soil, manure sand and forming beds.	1 bed.	1 male for 2 bed.	1·00	March.	..
5 Cost of farmyard manure flr manuring the beds including transport charge	1 bed	1 cart load per bed at Rs. 6·00	3·00	March	..
6 Cost of straw and transport of the same for covering the beds after cowing seeds.	1 cart load of straw	Rs. 1 for 40 of beds	0·2	April	..
7 Sowing seeds, spreading a thin layer of earth to cover the seeds and covering the beds with straw.	1 male mazdoor at	2·00 for 4 beds	0·50	April.	..
8 Watering the beds from the date of sowing in April for a period of over one year on non-rainy days till it is taken out for planting.	1 male at	1·50 for 20 beds 10 Rs. for 200 days.	10·00	April to March	Flood watering should be resorted by construction of drains, etc., or sprinkler irrigation.
9 Weeding the beds and losening the soil as and when necessary.	Should be carried out by watering mazdoors.				
10 Application of pesticide to prevent pests and diseases.	Per bed.	L.S.	0·50	April-May.	..
11 Fencing with brushwood including collection and transport.	One male at 2 per 20 metres.	..	0·20	April-May	..
	Contingencies	..	0·75		
		Total ..	20·00		

APPENDIX XVII A—*cont.*

***B. Formation of Teak Avenue plantation** (one planting km. or 570 plants—Spacing 3·5 m. apart).*

Serial number and Description of works (1)	*Quantity.* (2)	*Rate.* (3)	*Amount* (4)	*Time schedule* (5)	*Remarks* (6)
1 Clearing the rea to a length of 1km. by cutting throny bushes and other valueless growth.	7½ male mazdoors.	Rs. 2	15·00	May.	..
2 Aligning and staking 3·5 m. spart by making depression with mammatties.	5 male mazdoors.	Rs. 2	10·00	June-July.	..
3 Preparing saucer like pits each 60cm. dia. and 15 cm. depth to hold one pot of water.	10 male mazdoors.	Rs. 2	20·00	July-August.	..
4 Preparing stumps ..	600 stumps.	Rs. 4 per 1,000 stumps.	2·40	Do.	..
5 Transport of stumps. ..	600 stumps.	L.S.	2·00	Do.	..
6 Planting at 3·5 m. aprt in crow bar holes.	2 male mazdoors.	Rs. 2.	4·00	Do.	..
7 Watering on alternate days with one pot of water for the first 20 dyas from the date of planting in July.	40 female mazdoors for 2 km.	1·50	Rs. 60	July.	It is expected that watering will be completed by the end of July.
8 Plot mazdoor for protection, watering and doing other cultural operations from the date of planting in July to 31st March.	1 male mazdoor per 2 m.	Rs. 45 per month.	405·00	July-March.	..
9 Female mazdoor tor assist the plot mazdoor between.	1 female per 2 mazdoor. km.	Rs. 30 per month	180·00	1st August to	.. 4th October and 1st January to 31st March.
10 Replacement of casualties by plot mazdoors.				September October.	..
11 Digging four wells 1·5 m. radius and 2m. depth.	Four wells.	7·50 per well.	30.00	February	.. during summer month.
		Total ..	728·40		

Maintenance II year

1 Protection, watering, weeding and cultural operations.	Six months at 45/ per month for male. and 30 per month for female.	1 male and 1 female. mazdoors for 2km.	270·00 130·00	1st April to 30th Sept.	Watering except on rainy days and days following rainy days.
2 Protection and doing cultural operations.	6 months at Rs. 45 mazdoor male.	1 male per mazdoor for 2kms.	270·00	1st October to 31st March	..
3 Replacement of causalties.	This will be done by the plot mazdoor.			July-August.	
			720·00		

Cost of formation during 1st	728·00
year maintenance in second year.	720·00
Cost of nursery stock. 66 bed per km. of planting	14·00
Total cost	1,462·40

APPENDIX—XVII COST OF FORMATION.

B-Cashew.

The following statement shows the approximate cost of formation of cashew plantation per hectere till the end of third year.

Spacing : 7m X 7m — 204 plants per hectare.

Nursery cost — Nil.

Serial number and Description of work. (1)	*Quantity.* (2)	*Rate.* (3) RS. P.	*Amount.* (4) RS. P.	*Time schedule.* (5)	*Remarks.* (6)
First year—					
1 Clearfelling the saleble and unsalable growth tractor.	..	..	..	January to March.	Item 1 to 2 will be done Departmentally only when there is demand in public auction.
2 Uprootal of stumps levelling the site etc. by tractor.	..	..	..	April, May.	
3 Burning the unsalable growth	5 male mazdoors.	2·00	10·00	May	..
Ploughing the area with tractor.	..	..	..	May, June.	Departmental ploughing.
4 Aligning and staking at 7m × 7m. spacing.	204 stakes 2½ male mazdoors.	2·00	5·00	June.	..
5 Digging pits of (30) cm. in hard red earth.	204 pits (5·5m) per unit.	3·30	6·00	June	..
6 Refilling the pits with excavated soil.	204 pits 2 male mazdoors.	2·00	5·00	June	..
7 Dibbling cashew seeds	204 pits 1 male mazdoor.	2·00	2·00	July	..
8 Formation of saucer 1m. diameter.	4 males	2·00	8·00	July, August	..
9 Replacing causualties	1 male per hectare	2·00	2·00	August, September.	..
10 Weeding and soil working to a diameter of 1m. and to a depth of 15–20 cms. around the plants and reforming saucers.	6 males.	2·00	12·00	December	..
11 Forming brushwood fence around each plant.	204 plants	L.S.	20·00	July, August	..
Second year.					
1 Replacement of casualties by reopening pits at 20 per cent to 25 per cent.	50 pits.	L.S.	5·00	July, August	..
2 Weeding and soil working as in 1st year.	204 pits. 8 male mazdoors.	2·00	15·00	December.	..
3 Sowing of kolingi seeds in between the lines including the cost of seeds (2 Kg. per hectare).	L.S.	L.S.	15·00	September.	..
4 Formation of contour bunds, waste weirs etc.	L.S.	L.S.	100·00	August September.	..

APPENDIX XVII COST OF FORMATION—*cont*.

B–CASHEW—*cont*.

Serial number and Description of work. (1)	*Quantity.* (2)	*Rate.* (3)	*Amount.* (4)	*Time schedule.* (5)	*Remarks.* (6)
		RS. P.	RS. P.		
Second year—cont.					
5 Consolidation of bunds by planting suitable species.	..	L.S.	10·00	September, October.	..
6 Strengthening the brushwood fence around the plant including transport of fencing materials.	..	L.S.	10·00		..
Third year.–					
1 Application of fertilizer at the rate of 1 Kg per plant including cost of fertilizer.	204 plants per hectare.	L.S.	60·00	September	..
2 Application of pesticide (twice) including cost.	per hectare.	L.S.	30·00	October, November, December, January.	..
Contingencies.	..	..	4·00	..	..
	Total	..	320·00		

APPENDIX—XVII-C.

MODEL ESTIMATE FOR THE FORMATION OF CASUARINA PLANTATION.

Cost of formation :

The cost of formation of one hectare of casuarina plantation along with maintenance is furnished below :—

Espacement—2·5 m X 2·5 m.

Total number of plants — 1,600 + 1,600 + 400 at the rate of 2 plants per pit + 25 per cent casualties.

Number of nursery beds required.

Mother beds per hectare of planting—0·6 hectare.

Transplant bed per hectare of planting — 1 bed.

Nursery cost per bed of 10 m X 1m X 60 cm.

Serial number and Particulars of operation.	*Quantity.*	*Rate.*	*Per Unit.*	*Amount.*	*Time schedule.*
(1)	(2)	(3)	(4)	(5)	(6)
		RS. P.		RS. P.	
1 Digging new area to a depth of 50 cm. & (50 cm.) breaking clods.	1	0·70	cm.	3·50	November.
2 Forming raised beds..	1bed for 1 male mazdoor.	2·00	2 beds.	1·00	November.
3 Cost of cowdung and mixing in the bed.	¼ cart load per bed.	10·00	Cart load & 1 male for 4 beds.	2·50 0·50	November.
4 Cost of straw and transporting the same for covering the beds after sowing the seeds.	1 cart load of staraw.	10	for 40 beds	0·25	November.
5 Sowing of seeds, spreading a thin layer of earth to cover the seeds& covering the beds with straw.	1 male mazdoor.	for 5 beds. at Rs. 2·00		0·40	November-December.
6 Watering the beds from the date of sowing in December for 6 months on non-rainy days.	1 female for 15 days.	at Rs. 1·50 per day.		18·00	December-July.
7 Pricking out from mother beds and transplanting at 5 cm. square in transplant beds.	10 females at 1·50 per bed.		..	15·00	January.
8 Weeding the beds	This work can be done by the watering mazdoors.				December to July.
9 Fencing with brushwood including collection of materials and transport.	One male per bed or 0·10 per metre.			2·00	November, December.
Contingencies			..	0·85	
			Total ..	44·00	

FORMATION OF CASURINA PLANTATION.

Serial number and Particulars of operation. (1)	*Quantity.* (2)	*Rate.* (3) RS. P.	*Per unit.* (4)	*Amount.* (5) RS. P.	*Time schedule.* (6)
1 Dugging wells at the rate of 2per hectare	2 10 males	at 2 per well.		40·00	June–July.
2 Aligning and slacking at 2·5 m × 2·5 m	1 hectare	2 males at	2	4·00	June.
3 Pittîng (30) cm. 3 pits	1,600 pits	12½ males at 2.		25·00	June.
4 Pricking out seedlings from the nursery and transporting to planting site.	1600 + 1600 seedlings.	1 male at 2		2·00	June–July.
5 Refilling pits pouring one pot of water, planting after pudling and pouring another pot of water on the first day.	16 females at 1600 seedlings.		1·50	24·00	June-July Watering (100 seedlings per female).
6 Watering ½ a pot of water per plant for 30 days from the day following planting on non-rainy days in June-July.	100 females.	At 1·50 each.		150·00	30 days in June-July.
7 Watering ⅓ pot of water per plant on alternate days from 1st August to 31st December for 90 days on non- rainy days.	100 females 90 females.	At 1·50 each		150·00	August to Deecber.
8 Watering the backward plants estimated at 25 per cent with one pot of water once in 5 days from 1st January to 31st December.	30 females.	.	1·50	45·00	January to March.
9 Replacement of casualties at 25 per cent including reopening pits.	400 seedings.		2.00	3·00	August–September.
10 Weeding once to a radius of 75 cm. around the plant.	4 females per hectare.		1·50	6·00	Do.
11 Fencing with brushwood including cost of collection and transporting materials.	25 males		2·00	50·00	Do.
12 Plot mazdoor from the date of planting, i.e. July to March.	1 male upto 40 per hectare.	60 per month		13·50	July to March 9 months.
		First year Total	..	513·00	
		Second year.			
1 Replacement of casualties at 25 per cent by reopening pits.	400 plants.	2 females.		4·00	July.
2 Watering the backward plants estimated at 25 per cent with one pot of water once in 5 days from 1st April to land of June for 75 days excluding rainy days.	400	30	fcmales 1·50	45·00	April to June.
3 Maintenance of well dug up during the year of formation.	6 males for 2 wells.	Rs. 2 each ..		12·00	April.
4 Strengthening the fence formed with poles and thorns including cost of collection and transport of materials.	5 males.	Rs. 2 each.		10·00	Do.

Serial number and Particulars of operation.	*Quantity.*	*Rate.*	*Per unit·*	*Amount.*	*Time schedule.*
5 Plot mazdoor from April to October for 6 months.	For every 40 hectare.	6 months at 60 per month·		9	April-October.

	RS.
First year cost	513·00
Second year cost	80·00
Nursery cost (*a*) for 0·6 mother bed	26·40
(*b*) For 1 transplant bed	44·00
Contingencies	0·60
	665·00

Cost of installing one hand pump.

1 Pump	50·00
2 Filter point-35 cm.	30·00
3 Coupling, thread, etc.	5·00
4 Cost of 10 m. of G. I. pipe 35 mm. at Rs. 8 per metre.	80·00
5 Fixing charges	50·00
Total ..	215·00

APPENDIX—XVII-D.

FARM FORESTRY PLANTATIONS.

The details of cost of formation of one hectare of Farm Forestry plantations including the nursery cost are given below :—

Spacing = 3·5 m. X 3·5 m.

Nursery cost (One unit of 1000 polythene container plants).

Serial number and particulars of work.	*Quantity*	*Rate.*	*Amount.*	*Time schedule.*	*Remarks.*
(1)	(2)	(3) RS. P.	(4) RS. P.	(5)	(6)
1 Collection and transport of sandy loam soil and farm yard manure including the cost of farmyard manure and filling up the polythene bags.	1000	16·00	16·00	..	..
2 Cost of polythene bags ..	Market rate.	..	35·00	..	..
3 Dibbling of treated seeds at 2 seeds per container and arranging the containers in beds of 2,000 each.	One female	1·50	1·50	..	..
4 Forming brushwood fence around the nursery including cost of collecting and transport of material.	..	0·10 per metre.	2·00	..	..
5 Digging wells 5 m. at the top and 3 m. at the bottom.	8 males.	2·00	16·00	..	..
6 Watering the container plants from the date of sowing till planting for the first 60 days twice daily.	1 female ..	1·50	18·00	..	One female can water 5,000 seedlings for 60 days 12 females.
7 Watering the container plants from the date of sowing till planting for the first 60 days twice daily. once daily till planting for 60 days and shifting.	1 female.	1·50	9·00	..	One female can water 10,000 seedlings. For 60 days 6 females.
		Total	..	97·50	

Cost of formation of plantation—

One hectare at 3·5m. x 3·5 m. spacing—804 plants per hectare,

First Year—

1 Aligning and marking at 3·5m. x 3·5 m. in dry condition.	3 males	2·00	6·00	June
2 Aligning and marking 3.5m x 3.m. in slushy condition.		1	8·00	June
3 Digging pits of (30) cm. 5 dry condition.	804 pits or 27m.	0·70 per m.	18·90	July
4 Transporting container plants to the planting site over a lead of 0·5 km.	804 plants	0·50 per 100 plants.	4·00	July
5 Planting including the refilling the pits.	804 plants pits.	1·50 per 100 pits.	12·00	July—August
6 Wedding and soil working to a radius of 50 cm. around the plants to a depth of 15 cm.	804 seedlings	3 males at Rs. 2.	6·00	September

APPENDIX XVII D—*cont.*

Serial number and particulars of work. (1)	*Quantity.* (2)	*Rtee.* (3)	*Amount.* (4) RS. P.	*Time schedule.* (5)	*Remarks.* (6)
7 Plot mazdoor from the date of planting for 4 ha.	8 months at 60 per month.	2 per day.	12·00	August to March (480 for 40 ha. 12 for ha.)	
Second Year.—					
1 Replacement of casualities of South-west monsoon planting during January as the water recedes including nursery cost.	25 per cent or 200 seedlings.	400 per 1,000	4·00	January	
2 Replacement of cusualties of North-east monsoon during July—August including nursery cost.	25 per cent or 200 seedlings.	4000 yer 1,000	4·00	July-August	
3 Soil working to a radius of 50 cm. around the plant to a depth of 15 cm.	804 seedlings.	3 males at 2.	6·00		
		Total ..	14·00		

Farm forestry plantations.

Cost of formation during first year ..	63 00
Maintenance cost in second year ..	14 00
Nursery cost for 1 ha. including .. .. replacement at 25 percent 800 + 200 at 0·10 per seedling.	10 00
Total ..	87 00

APPENDIX—XVII-E.

STANDARD ESTIMATE FOR ONE HECTARE OF BAMBOO PLANTAION.

Serial number and Description of work.	*Quatnity.*	*Rate*	*Per unit.*	*Amount*	*Time schedule*	*Remarks.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Rs. P.				
1 Survey and demarcation	(Done by the staff)				April.	
2 Clearing the area by cutting thorny bushes and other valuless growth.	2 male	Rs. 2 per	one M. M.	4·00	Mazdoors.	
3 Cnllection of stakes	275	1·00	100	2·75	April.	
4 Aligning and staking sundries	3 boys	1·50	each	4·50	April.	
				0·50		
5 Digging of pits of (60) cm.3 (594 or 600 c.m.)	275	0·70 c.m.	..	42·00	April.	
6 Pruning uprootal of seedlings with ball of earth, tying with a piece of gunny and loading	275	..	..	12·50	June—July during planting.	
7 Transport from nursery to planting site in cart loads.	275 or 2 carts.	10·00	10·00	10·00	June—July during planting.	
8 Refiling pits, planting puddling after pouring of pot of water and scraping around seedlings.	275	..		12·50	June—July during planting.	
9 Scraping and soil working to a depth of 10·15 c.m. to a radius of 1 m. around the plant once.	275 plants 8 male mazdoors.	2·00 m.m.		16·00	September	
10 Scraping and soil working to a depth of 10·15 c.m. to a radius of 1 m. around the plant once.	275 plants 8 male mazdoors.	2·00 m.m.		12·00	December.	
11 Re-opening pits for healing up casluaties 29 per cent.	60 pits. or 13 c.m.	0·60 c.m.		7·80	August—September.	
12 Replating casualty including loading and unloading.	60 pits 4 male mazdoors	2·00	M.M.	8·00	August—September.	
13 Fencing with thorny bushwood around each seedling 275 plants.	275	0·25	Plant	68·75	July-August	
14 Reopening casualty pit for replacement 10 per cent.	30 pits 2 male mazdoors	Rs. 2	M.M.	4·00	July	
15 Planting in reopened pits including preparation collection of seedlings from the nursery and transport to the planting site.	30 pits 2 male mazdoors	Rs. 2	M.M.	4·00	August	
16 Scrapping and soil working 10-15 cms. deep to a radius of one metre around the plants.	275 plants 8 male mazdoors	Rs. 2	M.M.	16·00	September	
Second Year maintanance.—						
1 Tending	.. ..	275	Per ha.	7·50		
2 Nursery cost per seedling of 2 years old.		..	..	1·00		

N. B.—All the estimates may be revived once in three years. It is desirable to start work study on various nursery and planting operations before preparation of estimates.

APPENDIX - XVIII.

RESULTS OF SOIL ANALYSIS OF SOIL SAMPLES OBTAINED FROM THE VARIOUS FOREST BLOCKS OF THANJAVUR FOREST DIVISION.

Soil samples were collected from various forest blocks of Thanjavur division. These samples were sent to Soil Testing Laboratory, Aduthurai for analysis. The reaction of soil, salimity, nitrogen content phosphorus content of the soil etc., furnished by the Soil Chemist for the soil samples collected from the following forest blocks are furnished below :—

Survey number.	*pH.*	*LIC.*	*Texture.*	*Available nutrient status.*			*Remarks.*
				N. *O.C.* *per cent.*	*P.* *lb/ac.*	*K.* *lb/ac.*	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Pattukottai Range—Aranthangi taluk—							
I. **Manamelkudy**—							
sample 1	7·0	L.1	S	VL ·187	L 9·6	VL O	..
sample 2	7·5	·15	S	L ·357	L 5·2	VL O	..
sample 3	7·1	L.1	S	VL ·221	L 5·2	VL O	..
II. Ettiathalai —							
sample 1	MA 8·3	·15	L	VL ·289	VL 4·8	VL O	..
sample 2	7·2	·2	C	L ·425	M 18·4	VL O	..
sample 3	MA 8·2	·15	L	VL ·238	VL 2·4	VL O	..
III. **Kurumbur**							
sample 1	6·1	L.1	L	M ·595	M 16·8	VL 17	..
sample 2	8·1	2·1	SL	VL ·238	M 15·6	VL O	..
sample 3	6·5	2·5	C	VL ·051	L 7·2	VL 17	..
sample 4	MA 8·4	·2	CL	VL ·306	VL 4·6	VL 8	..
IV. Melpanaikadu—							
sample1 ..	M.A. 8·3	·2	CL	L ·425	L 5·2	VL O	..
sample 2	MA 8·2	L.1	CL	VL ·136	L 5·2	VL O	..
sample 3	MA 8·5	·25	CL	VL ·187	L 6·8	VL O	..
V. Senthengudy—							
sample 1	6·6	·15	L	L ·408	L 5·6	VL 8	..
sample 2	MA 8·3	·1	CL	L ·408	L 6·4	VL 17	..
sample 3	MA 8·1	L.1	SL	VL ·017	VL 4·4	VL 17	..

APPENDIX—XVIII—*cont.*

Survey No.	*pH.*	*E.C.*	*Texture.*	*Available nutrient status.*			*Remarks.*
				Nl OlC. percent.	*P. lb/ac.*	*K. lb/ac.*	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VI. Avanam—							
sample 1	8.0	L.1	S	L ·374	L 6·8	VL O	..
sample 2	7·1	L.1	S	L ·476	M 16·8	VL O	..
sample 3	MA 8·3	L.1	S	L ·408	VH 186·0	VL O	..
No. I Plantation Range, Thanjavur—							
1 Komapuram—							
sample 1	Acidic 5·8	0·1	CL	·538	4·8	33	Recommendation by Agricultural Chemist Soil Science and Fertilisers, Aduthurai. Apply one tonne of lime.
sample 2	Acidic 5.4	0·1	CL	0·630	8·0	33	Apply two tonne lime.
sample 3	Acidic 5·3	0·1	CL	·365	0	25	Do.
sample 4	Acidic 4·8	0·1	CL	·374	5·2	17	Apply 2½ tonne lime.
2 Neppugai—							
sample 1	Acidic 4·8	0·1	CL	·479	2·0	17	Apply 2½ tonne lime.
sample 2	Acidic 5·3	0·1	CL	·701	4·0	17	Apply 2 tonne lime.
sample 3	Acidic 4·9	0·1	CL	·466	O	17	Apply 2½ tonne lime.

NOTE—

L = Low.
VL = Very low.
M = Medium.
VH = Very high.

Texture.

S = Sandy.
L = Loam.
C = Clay.
SL = Sandy loam.
CL = Clay loam.
MA = Moderately alkaline.

APPENDIX XIX.

CONTROL JOURNAL.

(List of headings for the control journal to be maintained in loose leaf files by the District Forest Officer.)

I. General.	***Nature of entry.***
a. Timber plantation working circle.	Brief notes in narrative form regarding the suitability of areas alloted to each circle works done during the year, the position at the close of each year referring to arrears deviations, amendments to working plan prescriptions, reservation, disreservation, etc. (Short notes amplifying entries in control forms and record of works will be useful.)
b. Cashew working circle	
c. Casuaring working circle ..	
d. Mangrove working circle ..	
e. Minor forest produce working circle.	
f. Miscellaneous regulations ..	

II. Timber plantation working circle—

A. Growing stock—

Notes on the existing growth stock and the relative density and composition of the crop in different parts of the planting unit, girth and height increment, stocking and mortality, etc.

B. Factors influencing the crop—

1. Notes on various forms of climatic or natural damage to the crop.

2. Illicit fellings, grazing and other forest offences and suggestions to prevent them.

3. Notes on the extent to which climbers choke the timber species and on the need if any for tending measures.

C. Regeneration—

1. *Seeds.*—Notes on the collection of seeds by Genetics branch from seed production plots (for teak only) etc. Difficulties encountered by them and suggestions. Notes on germination percent and plant percent, pre-treatment of seeds, etc.

2. *Nursery.*—Comments on quantity of seeds per standard bed with reference to germination percentage, plant percent, method and quantity of watering, watering regime, etc., number of plants obtained and weeding the nursery. Suggestions for improving the nursery technique including method of watering and watering regime.

3. *Planting.*—Notes on comments on time, monsoon, method of planting, size of stumps (root shoot cuttings) watering regime, etc.

4. Detailed comments on the success or failure of the artificial regeneration measures prescribed with reason.

5. Suggestions for improvement or modifications of technique.

6. Comments on the existing watering technique and regime with suggestions for modifications, if any.

7. Notes on the relative success attained with each of the secondary species viz., *Dalbergi, latifolia, Dalbergia sissoo, Terminalia tomentosa* and *Pterocarpus marsupium* in areas unsuitable for teak.

8. Notes on weeding, soil working and tendings proposed and suggestions to modify them.

APPENDIX—XIX—*cont.*

9. Notes on the thinnings prescribed and how they work. Applicability of the All India Tables, etc.

10. Notes on conversion and sale of thinned poles.

D. Markets—

1. Prices of poles, small timber and firewood in various markets obtained by thinning.

E. Summary of Revenue and Expenditure—

A summary of annual revenue and expenditure in such a form as mull facilitate comparison with the financial forecost in the Working Plan.

III. Cashew working circle—

A. Growing stock—

Notes on the existing growing stock and the relative density and composition of the crop in different parts of the planting series, crown development and height, stocking and mortality, etc.

B. Factors influencing the crop—

1. Notes on various items of climatic or natural damage to the crop.

2. Illicit fellings, grazing and other forest offences and suggestions for preventing them.

3. Incidence of fire and comments on the necessity for an adequacy of the fire protection measures prescribed. (Practically)

4. Notes on the extent to which climbers choke coppice growth and on the need if any for tending measures.

C. Exploitation :

Exploitable growth if any in any of the panting series. Yield obtained and revenue realised by sale of such growth.

D. Markets :

Notes on market demands, selling price, comments on yield per hectare.

E. Regeneration :

1. Notes on the collection of seeds by Genetics Branch from Seed Production plots. Difficulties encountered by them and suggestions.

2. Notes on germination percent and plant percent.

3. Planting—Time, monsoon, method of dibbling seeds, replacement of casualties, mulching, soil working, fertilizer application and insecticide application.

4. Details comments on the success or failure of the regeneration measures prescribed with reasons.

5. Suggestions for improvement or modification of technique.

6. Comments on Kumri regeneration and the effect of each Kumri crop on the forest crop. Notes on demand for Kumri and other matters pertaining Kumri cultivation.

7. *Tractor.*—Notes on using the tractor for ploughing, levelling and other purposes. Comments on difficulties encountered and suggestions for improvement.

8. Availability of labour supply for plantation work.

APPENDIX—XIX—*cont.*

F. Summary of revenue and Expenditure :—

A summary of revenue and expenditure in such a form as will facilitate comparison with the financial forecost in the working plan.

IV. Casuaring working circle—

A. Growing stock—

1 Notes on growing stock (Casuarina plantations) density and development of the stand, percentage of stocking, mortality, etc.

2. Comparative remarks on height growth, girth increment, production of firewood in the several falling series.

B. Factors influencing the crop—

Notes on (*a*) Climate, (*b*) Animals, (*c*) Insects, (*d*) Fungi, (*e*) Fire, (*f*) Man, (g) Weeds and Climbers, (h) Salanity of soil, etc.

C. Exploitation—

1. Notes on the suitability of the present division into felling series and formation of annual regeneration areas.

2. Notes on the suitability of the method of working prescribed.

3. Notes on contractors and labour supply.

4. Statement of yield obtained from each felling series intermediate yield (by pruning) and final yield (by felling) with comments, observations and comments on pruning and measures suggested for improving the same if necessary.

5. Statement showing cost of exploitation under—

(*a*) Clearfelling charges,
(*b*) Pruning expenditure,
(*c*) Cost of transport per tonne from forest to market with distance.
(*d*) Deviations if any from working plan prescriptions with detailed justification.

D. Measures for improvement :

1. Results of tending operations prescribed with costs.

2. Suggestions for improvement of communications and export routes.

E. Regeneration—

(*a*) *Seeds.*—Notes on seed collection ripening flowering ripening and method of collection. Difficulties encountered and suggestions.

(*b*) *Nursery.*—Comments on quantity of seeds per standard bed with reference to germination, percentage, plant percent, method of quantity of watering done, watering regime, date of pricking out, number of plants obtained and weeding in the nursery. Suggestions for improving nursery technique including method of watering and insecticide application.

(*c*) *Planting.*—Notes and comments on time, monsoon, method of planting, size of seedlings used in inland localities and near sea coast, their performance and behaviour, replacement of casualties, initial watering, watering regime, etc., comments and suggestions for improving the watering regime. Subsidiary silvicultural operations and the need to modify them.

APPENDIX—XIX—*cont.*

F. Markets—

1. Statement of the prevailing market price per tonne of fuel from final yield, from pruning, poles girthwise, etc.

2. Notes on market, selling prices, comments on yield per hectare and the gross revenue realised.

3. Comments on the position of the firewood market in general and on fluctuations in prices with probable reasons.

G. Statistics—

1. Observations on rate of growth in different plantations of known age.

2. Out-turn averages.

H. Summary of Revenue and Expenditure—

A summary of annual revenue and expenditure in such a form as will facilitate comparison with the financial forecast in the working plan.

V. *Mangrove working circle* :

A. Growing stock—

Notes on the growing stock, the relative fuel value of various species, distribution in the several felling series, etc.

B. Factors inflencing the crop —

1. Notes on various forms of climatic or natural damage to the crop.

2. Illicit fellings, illicit grazing by semi wild cattle and other forest offences and suggestions for preventing them.

3. Incidence of fire and comments on the necessity for an adequacy of the fire protection measures prescribed. (Practically there is no fire so far).

4. Notes on the extent to which climbers choke coppice growth and the need if any for tending measures.

C. Exploitation,—

1. Notes on the suitability of the present division into felling series with reference to the requirement of local markets.

2. Notes on the adequacy of the output of firewoods.

3. Notes on the suitability of the rotation and the methods of working prescribed.

4. *Detailed obervations on*—

(*a*) the growth of coppice shoots;

(*b*) causes for failure of coppice; and

(*c*) relative coppicing power of different species.

V. Notes on contractors and labour supply.

VI. Statements of prices realised from the several felling series and comments.

VII. Comments on why any particular series could not be worked in any year.

VIII. Full account of deviations from the working plan, if any, with detaiiled jutification.

D. Measures of improvement :

1. Remarks on the conduct of fire protection operations and their results with suggestions as to possible modifications in lay-out.

2. Remarks on the degree to which the closure to grazing was enforced.

3. Suggestions for the improvement of communications and export routes.

E. Regeneration :

1. *Natural regeneration.*—Observations on the extent of natural regeneration of various species in felled coupes.

2. *Seeding.*—Observation on the seeding of fuel species, time of seeding, etc.

3 *Artificial regeneration.*—Detailed comments on the success or failure of the regeneration measures prescribed with reasons.

4. Suggestions for improvement or modifications of technique.

5. Notes on germination power and plant per cent of seeds of various species.

6. Notes on the relative success attained with the various species attempted to be introduced.

F. General :

Observation and comments on the distribution, succession, zonation and adoptations of mangrove species.

G. Markets :

1. Notes on the adequacy of the provision made for catering to various local markets.

2. Prices of firewood in various markets.

H. Statistics .

1. Notes on the rate of growth of fuel species based on measurement of coppice growth of known age.

2. Out-turn averages.

I. *Summary of Revenue and Expenditure* :

A summary of annual revenue and expenditure in such a form as will facilitate comparison with the financial forecast in the working plan.

VI. *Minor Forest Produce working circle* :

A. Growing stock :

Notes on the different item of minor forest produce available in the division.

B. Factors influencing the crop :

Notes on (a) Climate, (b) Animals, (c) Insects, (d) Fungi, (e) Fire, (f) Man, (g) Weeds and climbers.

C. Exploitation :

1. Notes on the suitability of methods adopted by contractors in collecting minor forest produce.

2. Notes on contractors and on the labour supply.

3. Statement of prices realised per unit and comments.

4. Particulars of units worked departmentally on account of lack of demand from contractors with result.

5. Comments on duration of lease period and general comments on jurisdiction of lease units.

6. Notes on the suitability of the coconut plantations into 'Farms'.

7. Notes on the Palmyrah leases quantity removed and the revenue realised. Condition of palmyrah regeneration and suggestions for improvement of the same.

8. Comments on various fishing units and their working and suggestions for improvement.

9. Any feature of interest about the prdouce. Brief notes on the quantity collected —comments on any marked variation in the quantity.

10. Full account of deviations from the working plan prescriptions, if any, with full justifications.

D. Methods of improvement :

1. Suggestions to improve the exploitation of minor forest produce hitherto untapped, if any.

2. Suggestions for the improvement of methods of collection adopted.

3. Relative success or otherwise on the introduction of Palmyrah along the periphery of cashew and casuarina plantations with cost.

E. Markets :

Prices of various minor forest produce in the local markets and consuming centres.

F. Summary of Revenue and Expenditure :

A summary of annual revenue and expenditure in proper form to facilitate comparison with the financial forecast of the working plan.

VII. *Miscellaneous regulations* :

SECTION A—GRAZING REGULATIONS.

1. Annual abstract of grazing permits issued to villages. The following headings are suggested :—

(*a*) Year.
(*b*) Name of village.
(*c*) Number and description of permits issued.
(*d*) Number and description of permits issued in the previous year.
(*e*) Reasons for increase or decrease.

2. Notes on the suitability or otherwise of the agency of collection employed.

3. Notes on the suitability or otherwise of the grading year adopted.

4. Notes on the efficacy of closure of burnt areas (a) as a punitive measure and (b) as a silvicultural measure.

5. List of areas closed to grazing annually on account of fires with notes on the results of half yearly inspections.

6. Notes on the desirability or otherwise of closure of fuel coupes to grazing.

APPENDIX--XIX--*cont.*

7. Notes on the desirability or otherwise of permitting penning.

8. Notes on the damage done by the semi-wild cattle to the regeneration in mangroves and wild horses in Kodiakadu reserved forests.

9. Results of application of the prescriptions.

10. Serious violation of grazing rules.

11. Enforcement of penning possibility and collection of penning fee.

12. *Measures of improvement* :

(*a*) Notes on works carried out to improve water sources.
(*b*) Vaccination of cattle.
(*c*) Maintenance of health and hygiene in cattle pens.

13. Measures taken to control cattle incidence to save forests from over grazing and their results.

14. Statement of revenue and expenditure as laid down in the Madras Forest Code to facilitate comparison with the financial forecast made in the working plan.

B. Farm Forestry :

1. Notes on planting operations, spacing, watering regime, nursery technique and suggestions for improvement.

2. Notes on variations in development and growth between different stands of rotation and comments.

C. Wildlife :

1. Notes on preservation and promotion of wildlife measures prescribed and comments.

2. Population trends among wildlife species—remarks of vanishing species.

3. General observation and comments with reference to number of migratory birds found in different localities of the division.

4. Notes on prohibition of shooting of water birds with comments on their population.

5. Violation of game laws—important cases—working of anti-poaching gate, etc.

D. Soil Conservation :

1. Notes on various soil conservation measures prescribed.

2. Comments on suitability and utility of bunding and gully plugging.

3. Adequacy or otherwise of works prescribed.

E. Bamboo planting :

1. Notes on implementation of prescriptions.

2. Comments of nursery and planting operations and suggestions for improvement.

3 Remarks on growth and development of culms

F. Maintenance of miscellaneous plantations :

1 Notes on the implementation of prescriptions.

2. Notes on method of exploitation prices fetched, economics, yield variations in development and growth between different stands.

3. Notes on the coppicing power of Eucalyptus, its gorwth and development.

G. Dibbling Palmyrah along the boundary of forest blocks :

1. Notes on the implementation of prescriptions and success of regeneration and measures of improvement suggested.

H. Fire protection :

1. Remarks on implementation of fire protection measures with suggestions for possible change.

2. Amount spent, length fire traced and area burnt in each range, extent of foot paths cleared, etc.

I. Protection of Forests :

1. Brief notes on major offences detected.

2. Conduct of staff.

3. Offence detected by Special Mobile Patrol Party.

4. Vulnerable areas—peculiar difficulties.

5. Menace of semi-wild cattle in mangrove forests and wild ponies in Kodiakadu forests and their control.

6. Offences against Prohibition Laws and Arms Act.

J. Roads .

1. Details of new roads constructed. Remarks on maintenance of roads and extraction paths formed by the contractors in the forest areas. Comments on the implementation of prescriptions.

2. Details of metalling, maintenance work done and costs, etc.

K. Buildings .

1. Details of buildings constructed, type, cost, etc., comments on type design, method of roofing, availability of building materials, labour, probable utility, value of the building.

2. Details of renovations and major repairs.

L. Wells :

Comments of the maintenance of wells and their cost, position of water supply, etc.

M. Boundaries :

Remarks on implementation of prescriptions and comments. Progress made in boundary verification extent verified, locality covered, etc. Observations on demarcation of ex-estate forests.

N. Machinery :

Tractor.—Notes on the performance of tractor and turn of various regeneration operations like clearing, levelling. ploughing, bunding and soil working, etc., reduction of dependency on manual labour, efficiency of work cost of maintenance, etc

O. Administrative matters :

1. Suggestion for jurisdictional changes. Additions or deletions from the area of the division with full details.

2. Implementation of re-organisation of division proposed and comments on the working of reorganised divisions.

3. Variations in the permanent and temporary strength (Executive and Ministerial). Addition due to five year plan schemes—adequacy of staff.

4. Quality and competence of executive staff.

5. Quality and competence of ministerial staff.

6. Disciplinary matters—

   (i) General standard of discipline,

   (ii) Serious complaint dealth with.

   (iii) Statement of disciplinary cases during the year.

P. Education and training :

1 Number of trained and untrained rangers.

2. Number of trained and untrained Foresters and number deputed to the Tamil Nadu Forestry Training School, Vaigai Dam.

3. Number of trained and untrained Forest Guards and number deputed to the Tamil Nadu Forestry Training School, Vaigai Dam.

Q. Rural welfare :

1. Extension work done in rural areas.
2. Community plantations raised.
3. Notes on rural welfare schemes benefit in villagers.

R. Research :

1. Silvicultural research done in the division.
2. Application of any new methods.
3. Notes on useful exotics, seed production plots, sample plots, etc.

S. Special works taken up under schemes :

T. Visits of scientists and experts (both Indian and foreign) :

U. Contractors :

1. Standing and reliability.

2 Cases of black listing and refusal of property mark registers.

V. Notes on camps :

W. Inspection notes :

A file of inspection notes complete since inception of working plan to which cross references can be made under appropriate headings.

X. Miscellaneous :

Other matters not coming under any other headings.

Y. Financial results :

Results in each working circle compared with the working plan forecast for timber, cashew, casuarina, mangrove, minor forest produce, grazing, etc.

APPENDIX XX.

TIMBER PLANTATION WORKING CIRCLE.

(A) Control of regeneration operations :

Range :

Prescribed.				Done.						Control.		
Year.	Locality.	Area in hectares.	Salient features of technique (item wise).		Locality.	Area regenerated in hectares.	Implementation technique.	Total cost incurred.	Cost per hectare.	Deviations if any.	Authority and reason.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)

B. Control of cultural operations **(Thinning etc.)***:*

Range ;

Operations prescribed.				Operations carried out.					Yield obtained.		Revenue realised.		Control.		
Year.	Locality.	Nature of operations.	Area in hectares.	Year.	Locality.	Nature of operations.	Area in hectares.	Cost of operations.	Timber in cu.m. or poles in number.	Firewood in tonnes.	Total.	Rate per hectare.	Deviations if any.	Authority and reason.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)

CASHEW WORKING CIRCLE.

(A) Control of fellings :

1. Name of the Range
2. Name of the series.

Prescribed.					Done.	Yield in tonnes.		Revenue.			
Year.	Locality.	Coupe number.	Year of felling.	Area in hectares.	Area in hectares.	Total.	Per hectare.	Total.	Per hectare.	Deviations if any with authority.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)

(B) Control of plantation work:

Range :

Prescribed.				Done.				Technique.		Cost.		Control.		
Year.	Locality.	Coupe number or block number.	Area in hectares.	Year.	Locality.	Coupe number or block number.	Area in hectares.	Prescribed.	Done.	Total in Rs.	Per hectare in Rs.	Deviations.	Reasons and authority.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)

(c) *Control of thinnings :*

Range ;

Name of the series;

Prescribed.				Done.						Control.		
Year. (1)	**Name of the plantation.** (2)	**Locality or block.** (3)	**Area in hectare.** (4)	**Year.** (5)	**Name of the plantation.** (6)	**Locality or block.** (7)	**Area in hectare.** (8)	**Cost of operations.** (9)	**Yield obtained.** (10)	**Deviations.** (11)	**Reasons and authority.** (12)	**Remarks.** (13)

(d) *Plantation journal and ledger* :

1 Sketch of the plantation.

2 Name of the forest, locality or block, range, series, year of formation, coupe No. or plot No. etc.

3 Details of nursery technique (No nursery for cashew).

4 Description of the locality :

(*a*) Topography, (*b*) Soil colour, nature, depth, texture, etc. and (*c*) Original vegetation, species, density and height.

5 Clearfelling and uprooting :

(i) Method of execution (*a*) departmentally or by contractors.

(ii) By manual labour or tractors.

(iii) Date of commencement and completion.

(iv) Number of man hours or machine hours utilised.

(v) Quantity of saleable wood obtained.

(vi) Price fetched.

6 Details of preparatory works such as ploughing, levelling and soil working :

(*a*) Method of execution: Ploughing with tractor or country ploughing—ploughing with attachment (accessories) of tractor like ploughing with disc or arrow or tiller for soil working—levelling with blade—removal of root with root raker, etc.

(*b*) Date of commencement of work and completion.

(*c*) Number of man hours or machine hours utilised.

7 Alighing, staking and pitting.

8 Details of planting or dibbling with dates and number of plants planted on each date.

9 Replacement of casualties.

10. Note on Kumi, operations carried out by Kumridars, crops raised by them, yield obtained by them, period of lease, etc.

11 (*a*) Details of soil working, soil conservation works such as formation of contour bunds, construction of waste weirs; gully plouging, consolidation of bunds by planting suitable species.

(*b*) Date of commencement and completion.

12 Results of enumeration with details.

13 General inspection notes on the condition of the plantation, instructions by the inspecting officers, flowering, fruiting.

14 (*a*) General notes on the application of fertilisers, pesticide and their effect.

(*b*) Quantity and reason and method of application with the result.

15 Rainfall statement from the nearest station with an abstract of number of rainy days and rainfall in m.m. for every month.

16 Miscellaneous.

17 **Plantation** ledger showing monthly record of expenditure for the various items of expenditure. (Consisting of the following columns.)

Preparatory works.							Planting.		Maintenance.					Soil conservation works.			Miscellaneous.			
Year and month.	Clearing.	Burning.	Uprooting.	Ploughing.	Levelling.	Aligning and staking.	Pitting.	Dibbling seeds.	Replacement.	Weeding and soil working.	Fencing round plants.	Application of pesticide.	Application of manure.	Formation of contour bunds.	Construction of waste weir.	Consolidation of bunds by planting.	Annual expenditure.	Annual yield.	Annual revenue.	Remarks.**
(1)	(	3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)

** Cashew Plantations commence yield from 4th year onwards only.

CASUARINA WORKING CIRCLE.

A) Control of fellings:

Prescribed.						Implementation.						Yield in ton & Kg.		Revenue.		Control.		
Year. (1)	Series. (2)	Locality. (3)	Coupe number. (4)	Plantation year. (5)	Area in hectares. (6)	Year. (7)	Series. (8)	Locality. (9)	Coupe number. (10)	Plantation year. (11)	Area in hectares. (12)	Total. (13)	Per hectare. (14)	Total. (15)	Per hectare. (16)	Deviation if any. (17)	Authority and reason. (18)	Remarks.** (19)

** Yield should be given in detail, i.e.

1. Number of poles removed,
2. Firewood (Roots and billets),
3. Pruned materials (branches) in head-loads or cart-loads,
4. Fuel or firewood obtained by pruning the side branches (sullys) in tonnes. Revenue obtained by pruning and revenue obtained by clearfelling the coupe should be given separattly.

(b) ***Control of regeneration operations :***

Name of the Range :

Prescribed.					Work done.							Control.		
Year.	Series.	Locality.	Area in hectares.	Salient features of technique itemwise.	Year.	Series.	Locality.	Area in hectares.	Implementation of technique.	Total cost.	Cost per hectare.	Deviation if any.	Reason and authority.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)

(c) ***Control of cultural operations in Casuarina :***

(i.e. Pruning, etc.)

Name of Range :

Prescribed.					Work done.							Control.		
Year.	Name of the block or locality.	Coupe number.	Area in hectares.	Brief details of work.	Year.	Name of the block.	Coupe number.	Area in hectares.	Details of work.	Cost of operation.	Yield obtained.	Deviations if any.	Reasons and authority.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)

(d) *Record of works in Casuarina working circle :*

A. Name of the Range.

B. Name of the Series.

C. Name of the block or locality, coupe number and plot number, **etc.**

Year.	Nature and kind of work prescribed.	Para of Working Plan.	Area in hectares.	Method of execution.	Number of man hours or machine hours utilised.	Date of commencement.	Date of completion.	Total cost.	Cost per hectare.	Deviations if any.	Reasons and authority.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	**(13)**

(*e*) *Plantation journal* :

1 Sketch of the plantation.

2 Range, name of the forest, locality or block, series and year of formation.

3 Coupe number and number of plots.

4 Area of the coupe and the plots.

5 Description of the locality—(i) Topography; (ii) Soil, nature and colour, depth; (iii) Depth of water table.

6 Clearfelling—(i) Date of commencement and completion; (ii) Total yield and yield per hectare.

7 Fencing—(i) Materials used; (ii) Length; (iii) Quantum of materials used; (iv) Man hours utilised.

8 Ploughing (crops after first rotation)—(i) Method of execution; (ii) Number of hours used for country ploughing for tractor ploughing.

9 Aligning, staking and pitting—(i) Date of commencement and completion; (ii) Espacement; (iii) Size of pf. pits.

10 Planting—(i) Date of planting and details of planting; (ii) Species used; (iii) Number of man hours utilised.

11 Number of wells or hand pumps installed and their description.

12 Watering—(i) Dates with man hours employed and the area watered or number of plants.

13 Soil working and weeding—(i) Dates with man hours employed and the number of plants or area soil worked or weeded.

14 Replacement of casualties—(i) Number of plants utilised; (ii) Size and height of the seedlings; (iii) When replaced (i.e., date, month, etc.).

15 Pruning, etc.—(i) Yield obtained by pruning the side branches in head-loads or cart-loads; (ii) Yield of fuel obtained by pruning the side branches.

16 Result of enumeration with dates, i.e., percentage of stocking in January following the year of planting.

17 Rainfall statement with abstract of number of rainy days and the rainfall in m.m. for each month.

18 General notes on the condition of the plantation and instructions by the inspecting officers.

19 Miscellaneous—(i) Sowing of Kolingi, ploughing, thinning, extraction of dead trees, damage by natural causes, insect damage, etc.

TABLAR STATEMENT.

Name of Plantation (Locality and year of formation).

Name of the block or locality. (1)	Year of formation. (2)	Species planted. (3)	Area planted. (4)	Results of enumeration. (5)	Expenditure. (6)	Revenue. (7)	Intermediate yield. (8)	Final yield (9)	Remarks. (10)

Monthly details of expenditure should be posted in the following proforma.

Preparatory works.							Planting and Maintenance.											
Year and month. (1)	Clearing. (2)	Uprooting. (3)	Leavelling. (4)	Burning. (5)	Fencing. (6)	Digging up wells. (7)	Aligning and staking. (8)	Pitting. (9)	Transport of seedings. (10)	Planting. (11)	Watering first year. (12)	Watering second year. (13)	Replacement of casualities. (14)	Soil working and weeding. (15)	Sowing of Kolingi. (16)	Miscellaneous expenditure. (17)	Progressive total. (18)	Remarks. (19)

(*f*) Nursery journal--

1 Sketch of the nursery.

2 Size of nursery, permanent or temporary, area in hectare and locality.

3 Number of wells, pump-sets installed with details.

4 Size of beds, number of beds under each species, number of mother beds, number of transplant beds, etc.

5 Preparation of beds, manuring, etc.

6 Dates of sowing, quantity of seeds sown and number of beds.

7 Method and quantity of watering number of man hours employed.

8 Native of fertilizers, insecticides applied with quantity and dates.

9 Dates of pricking out from the mother bed and transplanting in transplant beds, number of seedlings pricked out and number of man hours utilised.

10 Watering method, regime and number of seedlings watered and man hours utilised.

11 Dates of removal of seedlings and the number of removed.

12 Pest attack, diseases, if any and measures taken.

13 Number of mazdoors employed.

14 Rainfall statement

Nursery ledger showing the monthly record of expenditure for various items should be given in the **following proforma.**

Cost of Formation.

Year and month.	Levelling.	Fencing.	Formation of beds (mother beds and transplant beds).	Manuring.	Wells.	Cost of watering.	Cost of pricking out and planting in transplant beds.	Application of insecticide, etc.	Total cost.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)

MANGROVE WORKING CIRCLE.

(a) Control of felling.

Range :

Series:

Prescribed.				Work done.						Control.	
Year.	Locality.	Coup Number.	**Area in hectares.**	Year of felling.	Locality.	Coupe Number.	**Area surveyed.**	**Area actually worked**	Year of working arrears if any.	Actuals of deviation; reasons with authority and arrears.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)

(*b*) *Record of yield from fellings :*

Series. (1)	Year. (2)	Locality and coupe number. (3)	Area felled in hectare. (4)	Total yield. (5)	Per hectare yield. (6)	Total amount. (7)	Rate per hectare. (8)	Remarks. (9)

MINOR FOREST PRODUCE WORKING CIRCLE

(*a*) *Control book :*

Prescriptions of the working plan.					Record of operations carried out.					Details of yield.		Control.		
Year. (1)	Name of produce. (2)	Unit of lease. (3)	Period of lease. (4)	Method of working. (5)	Year. (6)	Name of produce. (7)	Unit of lease. (8)	Period of lease. (9)	Method of working. (10)	Yield obtained. (11)	Gross revenue realised. (12)	Expenditure incurred. (13)	Deviations, if any, with authority. (14)	Remarks. (15)

(*b*) *Record of yield* (for each unit) :

Year.	Yield.							Remarks.
	Cashew.	Coconut.	Palmyrah.	Elendai	Fishing.	Tank barks.	Other minor forest produce.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

(*c*) *Record of revenue realised* (for each unit);

Serial number and name of the lease unit.	Revenue realised in Rupees for each year of the Plan period up to 1980–81.					**Remarks.**
	1971–72.	1972–73.	1973–74.	1974–75.	1975–76.	
1)	(2)	(3)	(4)	(5)	(6)	(7)

(*d*) *Control of regeneration operation :*

Regeneration.					Done.			Control.		
Year. (1)	Locality. (2)	Area in hectares. (3)	Salient features of technique (items wise). (4)	Year of operation. (5)	Locality. (6)	Area regenerated hectares. (7)	Implementation technique. (8)	Deviation, if any. (9)	Reason and authority. (10)	Remarks. (11)

(*e*) *Plantation journal :*

List of headings :—

1 Introduction
2 Situation
3 Nursery
4 Planting operations
5 Miscellaneous

TABULAR STATEMENT.

Name of plantation (Locality, block, etc.) :

Serial number. (1)	Name of the locality or block or R.F. or R.L. (2)	Year of formation. (3)	Species planted. (4)	Area planted. (5)	Technique adopted item wise. (6)	Result of enumeration. (7)	Expenditure. (8)	Revenue. (9)	Intermediate yield. (10)	Final yield. (11)	Remarks. (12)

(a) ***Control** book for grazing:*

Prescriptions of working plan.				Operations carried out.							Control.	
Year.	Total area in hectares.	Area open to grazing in hectares.	Name and area of localities closed to grazing in hectares.	Year.	Total area in hectares.	Area opened to grazing in hectares.	Name and area of localities closed to grazing in hect.re.	Number and description of cattle grazed.	Grazing revenue realised.	Grazing incidence per cow unit.	Deviations if any with authority.	** Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)

** If there is penning, name of the pen, details of penning such as numbers of cattle licensed to pen, etc., should be given.

N.B.—Areas closed to grazing—All casuarina and cashew plantations are closed to grazing for a period of five years including the year of formation whereas Mangrove working circle and coconut plantations at Manamelkudy are closed to grazing permanently.

(b) *Record of works :*

Prescription.			Work done.			Control.			
Year.	Nature of work.	Brief details of work.	Year.	Nature of work.	Details of work.	Cost incurred.	Deviations if any.	Authority and reason.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

Record of works (Common to all working circles)

Prescriptions.					Work done.					Control.				
Year. (1)	Working circle. (2)	Nature and brief details of work. (3)	Locality. (4)	Area in hectares. (5)	Year. (6)	Working circle. (7)	Nature and brief details of work. (8)	Locality. (9)	Area in hectares. (10)	Cost incurred for each item. (11)	Total cost. (12)	Deviations if any. (13)	Reasons and authority. (14)	Remarks. (15)

A—Prescriptions of the Working Plan.

B—Measures suggested in the Working Plan.

C—Measures neither prescribed nor suggested in the Working Plan but carried out during the year.

REGISTER OF DEVIATIONS.

(Common to all working circles)

Range :

				Working Plan.					
Year. (1)	Working circle. (2)	Serial number of deviation. (3)	Control form number and page. (4)	Paragraph. (5)	Prescriptions (6)	Nature of deviation. (7)	Reasons for deviations. (8)	Authority sanctioned with number and date of order. (9)	Remarks on any possible action to remedy the deviation. (10)

FINANCIAL STATEMENT

	Revenue.				Expenditure.			
Working circle. 1)	Working Plan forecost. (2)	Actuals. (3)	Difference between forecost and actuals. (4)	Remarks. (5)	Working Plan forecost. (6)	Actuals. (7)	Difference between forecast and actuals. (8)	Remarks (9)

Control of prescriptions—

Printed forms one fcr each working circle will be listed out in brief. The important prescriptions to be carried out during every year will be supplied to the District Forest Officer. This is essential to ensure that no important prescription is lost sight of and therefore it shall be the personl responsibility and duty of the District Forest Officer to write up these forms during every itself with implementation details. The prompt writing of these forms will greatly facilitate the exercising the other control forms and records prescribed besides exercising effective control over the implementation of the plan. As these forms would give a clear perspective of work to be done during each year their usefulness at the time of plan of operations discussion needs no special phasis. Ten sets of these printed forms will be supplied one for each year of the plan containing ten forms.

APPENDIX XXI.

LIST OF MAPS PREPARED FOR THANJAVUR FOREST DIVISION.

Serial number and name of Range.	*Particulars of map.*	*Scale.*	*Number of maps.*
(1)	t2)	(3)	(4)
1.	Key Map-Tanjore Forest Division.	1cm=2.534 km.	1
2.	Map Showing the distribution of Forest types.	1cm=2·534 km.	1
I. Teak Plantation working Circle.—			
1· Plantation Range No. I, Thanjavur and Plantation Range No. V, Mannargudi.	Thanjavur and Mannargudi Series.	1cm=0·633 km.	1 (3 sheets)
–do–	–do–	1cm=0.633 km.	1 (2 ,,)
2. Plantation Range No. II, Kumbakonam.	Kumbakonam Series·	1cm=0·633 km.	1 (2 ,,)
3. Plantation Range No. III, Trichy.	Thiruchirappalli Series.	1cm=0·633 km.	1
4· –do–	Virudhachalam Series.	1cm=0.633 km.	4
5. –do–	Chidambaram Series.	1cm=0·317 km.	2
6. Plantation Range No. IV, Sirkali.	Sirkali Series.	1cm=0·633 km.	1
			11
II. Cashew Working Circle.—			
1. Pattukottai Range.	Ettiathalai.	1cm=50 metres.	1
2. –do–	Kurumbur.	1cm=133·333M.	1
3· –do–	Sendangudy.	1cm=39·37 M.	1
4· –do–	Keeramangalam (Bits I and II).	1cm=50 M.	2
5. –do–	Merpanaikadu.	1cm=39·37 M.	1
6. –do	Avanam.	1cm=50 M.	1
7. Plantation Range No. I, Thanjavur.	Komapuram.	1cm=40 M.	1
8. –do–	Neppugai.	1cm=40 M.	1
			9
III. Casuarina Working Circle.			
1 Plantation Range No. III, Tiruchirappalli.	Manadhasapuram	1cm+0·079 m.	1 (2 sheets).
2 Plantation Range No. IV, Sirkali ..	Maharajapuram	1cm+40 m. ..	1 (3 sheets).
3 Do. ..	Sodiakudi	1cm+40 m. ..	1
4 Do. ..	Gopalasamudram	Do. ..	1
5 Do. ..	Mudalimadu	Do. ..	1
6 Do. ..	Pudupattinam	Do. ..	1
7 Do. ..	Alakudi	Do. ..	1
8 Pattukottai Range	Udayamarthanda puram	Do. ..	1
			8
IV. Mangrove Working Circle.			
1 Pattukottai Range ..	Thamarankottai felling series ..	1cm=0·07 km.	1
2 Do. ..	Muthupet felling series	1cm=0·158 km.	1
			2
V. Minor Forest Produce Working Circle.			
Pattukottai Range	Manamelkudi	1cm+50m. ..	1

Serial number and name of range.	*Particulars of map.*	*Scale.*	*Number of maps.*
(1)	(2)	(3)	(4)
VI. Miscellaneous Regulations.			
1 Farm Forestry Range, Aranthangi	Karuvadacheri 1966	1cm + 39·37m.	1
2 Do.	Vilanur 1967	1cm + Do.	1
3 Do.	Alapirandan 1967	Do.	1
4 Do.	Narpavalakudi 1969	Do.	1
5 Do.	Idayar 1969	Do.	1
6 Do.	Ponbethi 1970	Do.	1
7 Do.	Ponbethi 1969	Do.	1
8 Do.	Marpavalakudi 1970	Do.	1
9 Farm Forestry Range, Aranthangi	Poovalur 1970	1cm + 39·37m.	1
10 Do.	Map showing the area proposed fo future plantations.	1cm + 9·633m.	1
			10

Miscellaneous Regulations Protections.

1 Plantation Range No. IV, Sirkali	PudupattinamR.L. Bit I and II	1cm + 40 metre.	2
2 Pattukottai Range	Thuraikadu R.F.	1cm + 78·74 metres.	1
3 Do.	Kothamangalam R.L.	1cm + 50 metres	1
4 Do.	Vadakadu R.L.	1cm + 50 metres.	1
5 Do.	Maravakadu R.L.	1cm — 78·74 m.	1
6 Do.	Talainayar R.F.	1cm + 0·079 km.	1
7 Do.	Kodaikadu R.F.	1cm. + 0·158 km.	1
			8

PROCEEDINGS OF THE CHIEF CONSERVATOR OF FORESTS, MADRAS.

Proceedings D.Dis. 14815/70K 4, *dated* 14*th October* 1971.)

WORKING PLAN—Thanjavur Division—For the period from 1971–72 to 1980–81—**Sanctioned.**

Thiru K. A. BHOJA SHETTY, I.F.S.
Chief Conservator of Forests.

The working Plan for Thanjavur Division for the period from 1st April 1971 to 31st March 1981 is sanctioned.

K. A. BHOJA SHETTY,
Chief Conservator of Forests.

To
The Conservator of Forests, Development and Working Plans, Madras.
The Conservator of Forests, Tiruchirappalli Circle, Tiruchirappalli.
Copy to the District Forest Officer, Thanjavur Division, Thanjavur.